Testing the effectiveness and acceptability of a digitally distributed Compassion Focused Therapy intervention for acquired brain injury using single case experimental design

Submitted by Stuart Smith, to the University of Exeter
as a thesis for the degree of Doctor of Clinical Psychology, May 2019

I certify that all material in this thesis which is not my own work has been identified and that no material has previously been submitted and approved for the award of a degree by this or any other University.

Signature: ……..

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SCHOOL OF PSYCHOLOGY

DOCTORATE IN CLINICAL PSYCHOLOGY

LITERATURE REVIEW

Exploring the impact of self-compassion, self-criticism and shame in identity adjustment following brain injury.

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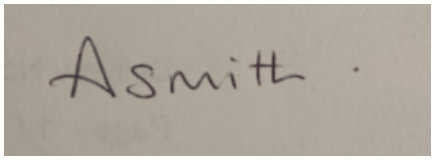

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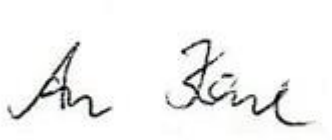

Target Journal: Neuropsychological Rehabilitation

Word Count: 5,818 words (excluding abstract, table of contents, tables, figures, list of figures and tables, references, footnotes, appendices)

Submitted in partial fulfilment of requirements for the Doctorate Degree in Clinical Psychology, University of Exeter

Abstract

There is on-going investigation into the adjustment process following acquired brain injury (ABI). Specifically, how people undergo changes to their sense of identity following an ABI. The Y-shaped model predicts that people will have to let go of the pre-injury sense of self and expectations and develop post-injury ones to adapt to the injury successfully. The literature on self-compassion offers useful insight into how this adjustment to identity may take place. The present study aimed to explore this phenomenon by synthesising qualitative studies to answer the following question: how do self-compassion, self-criticism, and shame affect the process of identity adjustment after an ABI?

A systematic search strategy identified 56 studies, of which 11 were included. A thematic synthesis was conducted based on the protocol developed by Thomas and Harden (2008). The thematic synthesis revealed a theme of identity development, pre-injury focus, shame, self-acceptance, and meaning-making. The relationship between these themes was considered and synthesized into an overall model of how the themes related to adjustment to identity. It was identified that themes related to self-compassion (self-acceptance and meaning-making) facilitated positive identity adjustment, while themes were identified that related to shame and self-criticism (pre-injury focus).

Results are considered and discussed in relation to the broader literature, limitations of the study and clinical implications.

Keywords: Identity adjustment, Self-compassion, self-criticism, brain injury, qualitative research.

Introduction

Acquired Brain Injury

Acquired Brain Injury (ABI) is an injury to the brain that occurs after birth. There is a dynamic and complex psychosocial process to adjust and adapt to life after ABI, with many different factors which can impact how an ABI affects people. A few of these include the severity of the injury, the location of damage, a person's personal circumstances like their marital status and employment and age at the time of injury (Langlois, Rutland-Brown, & Wald, 2006; Mosenthal et al., 2005). Also, there are neurological factors, such as cognitive reserve and neural plasticity (Anderson, Catroppa, Morse, Haritou, & Rosenfeld, 2005; Kesler, Adams, Blasey, & Bigler, 2003).

Developing an understanding of how people adapt to the sudden shock and consequences of an ABI is important. There has been significant interest in how biological processes interact with a range of psychological and social factors (Yates, 2003). Psychological factors include changes to mood, cognition, and sense of identity (Ownsworth, 2014; Goodwin & Devanand, 2008; Rohling, Faust, Beverly, & Demakis, 2009). Social elements include gaining or losing valuable roles, social contacts (Hallet, Zasler, Maur & Cash, 1994) and stigmatising views of people who have sustained an ABI held by the general population (Simpson, Mohr, & Redman, 2000). These variables can have a significant impact across multiple aspects of the person's life, including occupational, social, psychological and emotional functioning (Segal, 2010; Hesdorffer, Rauch, & Taminga, 2009).

Adjustment

Adjustment is defined as the changes in people's lives to accommodate for the injury, it is considered a key part of the rehabilitation process (Yeates, Gracey, & McGrath, 2008). Adjustment can occur across multiple different domains, including identity, emotional, social or cognitive. For the purpose of this review, I have focused on one aspect of adjustment: identity adjustment. Identity adjustment refers to the adjustment of an individual's sense of self following the injury (Muenchberger, Kendall & Nael, 2008). Carrol and Coetzer (2011) identified specific adjustment issues related to participant's sense of self following the injury such as negative self-comparisons, loss of sense of self and grieving of the loss of functions which have been found to be linked to higher levels of distress and grief after brain injury. Emphasis in identity adjustment is placed on how an individual integrates the ABI into their internal sense of their current self, potential, and qualities (Ownsworth 2014). Identity adjustment was chosen because it lends itself as a potential target for post-ABI psychological interventions informed by the concept of self-compassion (Ashworth, Gracey, & Gilbert, 2011).

The Y Shaped Model

The Y Shaped model outlined by Gracey, Evans, and Malley (2009) emphasises the reconciliation of the pre-injury self and functioning, with the current self and limitations post-injury. This process involves altering cognitive appraisals about the changes from the injury, post-traumatic growth and a process of grieving and moving on from the pre-injury sense of self. Gracey et al. (2009) argue that this adjustment is aided by incorporating an understanding of new limitations and ability levels, setting appropriate and achievable goals, developing self-awareness and revising both the personal and social self to incorporate the reality of the injury. This

requires people to undergo a process of updating a realistic self-representation, to cultivate a new identity and adapt more to current self-contexts (Ownsworth & Haslam, 2016).

Several factors could prevent the development of such adaptive new expectations of the self and positive identity adjustment. A series of case studies (Ashworth et al., 2011; Ashworth, Clarke, Jones, Jennings & Longworth 2014) suggest that self-criticism, shame, and self-compassion may be important factors that could either impede or facilitate identity adjustment.

Shame and Self-criticism as Barriers to Adjustment

Self-criticism is defined as a negative threat-based thinking pattern in relation to oneself (Gilbert, 2003), accompanied by an emphasis on our flaws and making negative self-comparisons to past selves or other people. Self-criticism has been observed as hindering identity adjustment after ABI (Freeman, Adams, & Ashworth, 2015).

Self-criticism is underpinned by shame (Gilbert, 2009), an emotion that is characterised by feeling that we are perceived by others as undesirable or rejectable. Often what people are most self-critical or threatened by, are characteristics, that they perceive themselves to have, that they feel makes them rejectable and undesirable to other people. Cognitive-attributional theories assert that shame is rooted in the necessity of our attachment relationships (Lewis, 1988). That shame as an emotion emerges between the ages of two and three when self-awareness begins to develop of social norms and expectations along with the capacity to evaluate oneself against these internalised social standards (Mills, 2005). A cognitive evaluation of not meeting expected standards then elicits the emotion of shame. This can often take place in the early years of life, such as a toddler or young

child, experiencing failure on a task they feel they should be to complete or rejection by a parent, they are likely to make internal, global, negative attributions about themselves (e.g. “I am incompetent”; Mills, 2005). If left unchallenged, these appraisals about the self then continue and form the basis of self-critical self to self-dialogues, (e.g. “I am an idiot”). The underlying global negative attribution of the self being rejectable can fuel self-critical dialogues which then leave people vulnerable to psychopathologies like anxiety and depression (Cheung, Gilbert & Ions, 2004). In the broader disability literature, shame is identified as a key factor in shaping and limiting people’s willingness to communicate that they have a disability (Matthews & Harrington, 2000). Shame can also prevent people from engaging in meaningful activity that may facilitate their rehabilitation (Schipper, Johanna, Visser-Meily, Hendrikx, Amba, 2011). Conversely, reduction of shame has also been observed as a consequence of adjustment following ABI (Charles, Butera-Prinzi, Perlesz, 2007).

Self-compassion as a Facilitator of Adjustment

The counterpart of self-criticism and shame is self-compassion, the ability to be kind and nurturing to oneself in times of adversity (Gilbert, 2009; Neff, Rude & Kirkpatrick, 2007). While self-criticism is characterised by a negative threat-based self to self dialogue about one’s own perceived flaws, self-compassion is characterised by secure and soothing self to self dialogue. This dialogue is rooted in care, sense of shared humanity and perspective, an example of self-compassion dialogue might be “recognising that mistakes happen to everyone”, “it isn’t possible to be perfect and it isn’t the end of the world”. While in self-critical self to self-dialogue ones flaw’s and limitations are perceived as threats to be attacked or flee from, in self-compassion the same flaws are viewed with kindness, acceptance,

nurture for future development and understanding (Gilbert, 2009). Higher self-compassion has been associated with better mental health and well-being (MacBeth, & Gumley, 2012). Given the importance of post-ABI identity adjustment for better emotional wellbeing, self-compassion could be an important phenomenon to consider. Conceptually, there is overlap between aspects of self-compassion, e.g., accepting ourselves and our experiences, and identity adjustment. In line with the Y shaped model, I would predict that self-compassion could be a mechanism to facilitate the positive integration and updating of people's sense of self and their identity post-injury. There is an emerging evidence base suggesting that Compassion Focused Therapy (CFT) can improve emotional well-being for people that have suffered an ABI (Ashworth et al., 2011; Ashworth et al., 2014). However, the mechanisms by which CFT lead to improvement in clinical outcomes following ABI is not well understood. This literature review will explore this.

Summary and Aim of the Systematic Review

Given the emerging evidence for a beneficial role of compassion-based interventions for mental health and wellbeing in ABI, it is important to understand the role self-compassion, shame and self-criticism play in identity adjustment after ABI. It can be hypothesised that self-compassion will facilitate adaptive identity adjustment. In contrast, and in line with the Y shaped model, shame and self-criticism would act as barriers towards identity adjustment. This review explores how self-compassion, shame and self-criticism impact identity adjustment following an ABI.

Method

The review was conducted in accordance with PRISMA-P guidelines (Preferred Reporting Items for Systematic Reviews and Meta-Analyses; Moher et al., 2015) to provide a structured framework to evaluate the evidence.

Eligibility Criteria

The SPIDER method (Sample, Phenomena of Interest, Design, Evaluation & Research) was chosen to determine the eligibility criteria for this review (Cooke, Smith, & Booth, 2012). The SPIDER method was chosen over the PICOS criteria due to the present review focusing on qualitative literature which often lacks an intervention or comparison group (Cooke et al., 2012). The decision to review qualitative papers was made due to identity adjustment being operationalised in this review in a way that was best captured through qualitative methods of inquiry.

Identity adjustment is operationalised as the process of incorporating the perceived impact of the injury and its impact on their sense of identity (Muenchberger, Kendall, & Neal, 2008).

Self-compassion was operationalised as developing and directing a loving, kind and accepting approach towards oneself and their experiences (Gilbert, 2003). Neff divides self-compassion into positive self-affect and a strong sense of self-acceptance (Neff et al., 2007). Self-criticism was operationalised as a form of negative self-attack in which one's flaws, shortcomings, and performance are emphasised and criticised within internal self to self-dialogue (Whelton & Greenberg, 2005) and often with negative self-comparisons.

Sample. Only studies where participants were individuals who had suffered an ABI were included, such as traumatic brain injury or stroke. Not included were neurodegenerative conditions like dementia.

Phenomena of interest. Participants' experience of identity adjustment.

Design. Studies using qualitative methodologies were included. Data could be collected using interviews, structured group discussion and/or focus groups.

Evaluation. The outcome of interest was how self-criticism, shame and or self-compassion impacted on the process of identity adjustment. Included were reference to phrases that fit within the concepts of self-criticism (e.g. "Feeling like a waste of space" or "I'd say I felt useless really you know."), shame (e.g. "feeling humiliated or embarrassed, or ashamed of the injury or resulting difficulties") or self-compassion (e.g. acceptance of the injury or being understanding of their challenges since the injury). These phrases were drawn from literature on self-compassion, self-criticism, and shame (Gilbert, 2009; Neff, 2003).

Research Type. Studies using any of the following qualitative approaches were selected: thematic analysis, grounded theory, discourse analysis, and phenomenological life story.

Table 1.

Spider inclusion and exclusion criteria.

SPIDER Criteria		
Criteria	Inclusion criteria	Exclusion criteria
Sample.	Aged ≥18 years Participants had a self-reported or diagnosed ABI, for example, traumatic brain injury or stroke.	Aged <18 years Not included were studies with participants with neurodegenerative conditions like Parkinson's or dementia. Or studies with participants with orthopedic injuries such as spinal cord injuries. Also not included were mental health difficulties.
Phenomena of interest	Participants' experience of identity adjustment following ABI.	The study focuses on a different aspect of rehabilitation (e.g., physical

		or cognitive outcome).
Design	Designs were included that used qualitative methodologies. The Data could be collected using interviews, structured group discussion and or focus groups.	Data from quantitative methodologies were excluded.
Evaluation	Studies were included if they explored how self-criticism, shame and/or self-compassion impacted on the process of identity adjustment following brain injury. Papers were included when there was reference to phrases that fit within the concepts of self-criticism (e.g. “feeling like a waste of space” or “I’d say I felt useless really you know.”), shame (e.g. “feeling humiliated or embarrassed, or ashamed of the injury or resulting difficulties”) or self-compassion (e.g. acceptance of the injury or being understanding of their challenges since the injury).	Studies were excluded if they did not have any reference to self-criticism, shame and/or self-compassion. Or if the studies themes included self-compassion, self-criticism or shame but not in relation to identity adjustment.
Research Type	Analysed using any of the following approaches: Thematic analysis, grounded theory, discourse analysis, and phenomenological life story.	Studies that did not use a formal qualitative analysis were excluded.

Information Sources

Four electronic databases were searched on the 6th January 2019: Web of Science, Embase, PsycINFO, and Medline. Peer-reviewed journal articles were included. Grey literature was not searched. Theoretical papers, reviews, editorials, conference proceedings and papers presenting quantitative data were excluded, along with any papers published in a foreign language.

Search Terms

A scoping exercise was undertaken to generate search terms for this review with a focus on identity adjustment following brain injury and the relationship with shame, self-criticism, and self-compassion. The following search terms were entered into the databases (Table 2).

Table 2.

Search Terms Entered in Databases

Research question area	Search terms
Brain injury	("brain injur*" or "head injur*" or "neurological insult*" or "neurological injur*" or mbi or tbi or abi or concus* or "post concus*") Mesh Terms used: PsycInfo = Traumatic Brain Injury, Embase: traumatic brain injury/rh, th [Rehabilitation, Therapy]. Medline: Brain Injuries.
Shame	(shame* or embarrass* or mortific* or humilia*) Mesh Terms: PsycInfo = Shame, Embase: Shame, Medline: Shame
Self-Compassion	("self compass*" or compass* or "self esteem*" or "self sooth*" or sooth* or "self confiden*" or "self kind" or "self reassur*") Mesh Terms: PsycInfo = Self-esteem, Embase: Self-esteem, Medline none
Self-Criticism	("self critic*" or guilt* or "self jud* self inadequate*" or "self blam* blam*" or "self hat") Mesh Terms: PsycInfo = Self-critcism, embase: Self concept, Medline: self-concept
Identity Adjustment	(adjustment* or "identity chang*" or growth or chang* or accept* or recover* or rehabilitat* or or "goal set*" or "self discrepanc*" or "self* awareness" or "self* concep*" or psychotherap*)

Note: Mesh terms were used within specific databases. These follow the search terms and specify which database it was used for.

The screening procedure used followed a specific progressive format (see Figure 1). Titles and abstracts of studies were screened against the SPIDER inclusion and exclusion criteria (Table 1). Then full texts included were read in full and assessed again against criteria to determine if they were included. Review papers' reference lists were searched for further papers but then excluded (Table 3). The reference lists of included articles were also searched for to identify relevant articles.

Table 3.

Review papers whose reference lists were hand searched;

Authors	Title of paper
Sherer, M., Davis, L. C., Sander, A. M., Caroselli, J. S., Clark, A. N., & Pastorek, N. J. (2014)	Prognostic Importance of Self-Reported Traits/Problems/Strengths and Environmental Barriers/Facilitators for Predicting Participation Outcomes in Persons With Traumatic Brain Injury: A Systematic Review.
Douglas J. (2010)	Placing brain injury rehabilitation in the context of the self and meaningful engagement.
Wilson B. (2013)	Neuropsychological rehabilitation: State of the science
Ownsworth, T., & Haslam, C. (2016)	Impact of rehabilitation on self-concept following traumatic brain injury: An exploratory systematic review of intervention methodology and efficacy.
Curvis, W., Simpson, J., & Hampson, N. (2018).	Factors associated with self-esteem following acquired brain injury in adults: A systematic review.
Bryson-Campbell, M.,	A scoping review of occupational and self-

Shaw, L., O'Brien, J., Holmes, J., & Magalhaes, L. (2013)	identity after a brain injury.

Data Extraction

The data extraction was completed by the lead researcher. This involved taking the relevant themes and comments, as set by the inclusion and exclusion criteria (See table 1) and placing them within a table for later data coding.

Data Synthesis

A process of thematic synthesis was undertaken to synthesise the data extracted from the papers. This followed the three-stage process described by in Thomas and Harden (2008). The first step was to code each line of the data concerning the relevance of the research question. These initial codes were then reviewed and combined into themes based on meaning. Finally, the relationships between the themes were synthesised together to address the research question. Coding was completed by hand and themes were extracted from each study with the wording used by the original author preserved. Thematic Networking (Attride-stirling, 2001) was used to organise and link themes from the different studies into global themes and identify where possible how the themes relate to each other. This was completed by initially coding the data into meaningful text segments, these codes were then collated into themes which a refined, the refined themes are organised into a network which reflects the relationship between the themes. The network is then reviewed and explored by returning to the original text and understanding it through the global themes. The

final network is then summarised and the relationship between the major themes is interpreted (Attride-Stirling, 2001).

Quality of Studies

All studies were assessed for quality and risk of bias using the CASP (CASP; 2019), CASP provided a consistent framework to evaluate the quality of each included study. The CASP accommodates different qualitative methodologies. Ratings take into consideration the study's credibility, transferability, and objectivity, the results, and the impact of the study (see Table 4). The CASP was used as it is a structured quality assessment tool for qualitative studies that is widely used in qualitative literature reviews (Walsh & Downe, 2006). The structured approach of the CASP was preferred to other unstructured quality assessment tools for qualitative papers (see Dixon-woods, Shaw, Agarwal & Smith, 2004). A structured rather than unstructured tool was preferred for this review due to the range of qualitative methods present in the review, as a structured approach does not require detailed understanding or description on the precise qualitative method. The CASP was used over the quality framework, another structured assessment tool (Spencer, Ritchie, Lewis, & Dillon, 2003), due to the quality framework being longer and more complex making it more difficult for the reviewer and second raters to use relative to the CASP.

Results

Critical Summary

11 studies were assessed as meeting the full inclusion criteria out of the 56 studies identified (See Figure 1). Forward and backward chaining was completed by

examining the reference lists and citations of all 11 papers to identify further relevant papers. This process identified 16 additional papers, whose full texts were screened. None of these articles met the criteria. Seven reported no themes directly or conceptually related to shame, self-criticism or self-compassion: one did not focus on identity adjustment, four studies had a quantitative methodology, and two were editorials.

Three random papers were sent to another Trainee Psychologist to screen for inclusion and quality. Two of the three papers had agreement with the criteria; this was resolved by explanation of the operationalization of self-compassion, self-criticism, and shame. Cohen's Kappa coefficient was used to assess the level of agreement (McHugh, 2012; Cohen's k = 0.399), and rated as fair agreement. The quality of all papers was rated the same; this gave an inter-rater reliability score of 1, suggesting complete agreement (Hallgren, 2012). Full details of these studies are highlighted in Table 4.

Sample and Location

All participants have suffered an ABI (n = 121). Most studies contained participants with a range of one to 35 years after injury (1, 2, 3, 4, 5, 6, 7, 9, 10, 11), one study had a range of 11 to 87 weeks (8).

The 11 studies were conducted across a range of different countries. One in Ireland (2). One in Canada (4). One in Australia (5). One in Japan (6). One in Sweden (7). One in Norway (8). One in the Netherlands (10). Four in the United Kingdom (1, 3, 9, 11).

Design

Most of these studies used one-to one interviews with participants (2, 3, 4, 5, 6, 7, 9, 10, 11). One study made use of focus groups (8) and another of structured group discussion (1). Finally, one study made use of participant observations in addition to a semi-structured interview (6).

Evaluation

All bar one study noted some aspect of self-compassion in relation to identity adjustment following an ABI (1, 2, 4, 5, 6, 7, 8, 9, 10, 11). Three studies considered both shame and self-compassion (1, 7, 11). Another two studies considered both aspects of self-criticism and self-compassion (8, 10). The most common aspect of self-compassion drawn on in the studies was elements consistent with the self-acceptance aspect of self-compassion (1, 2, 5, 6, 7, 8, 10, 11).

Research Type

The main method of analysis was thematic analysis, which was used by six of the studies (1, 2, 3, 5, 9, 11). Two of the studies (4, 10) used narrative analysis. One study used grounded theory (6). Another study used qualitative content analysis (8). One study used Structural analysis (9).

Quality assessment and risk of bias

The CASP qualitative checklist (2019) revealed that all the studies had good or excellent ratings. The majority of studies scored as meeting nine of the ten quality criteria (1, 5, 6, 7, 9, 11). A further three studies rated as meeting all of the quality criteria (3, 4, 10). The remaining two studies met eight of the ten criteria (2) and seven of the ten criteria (8).

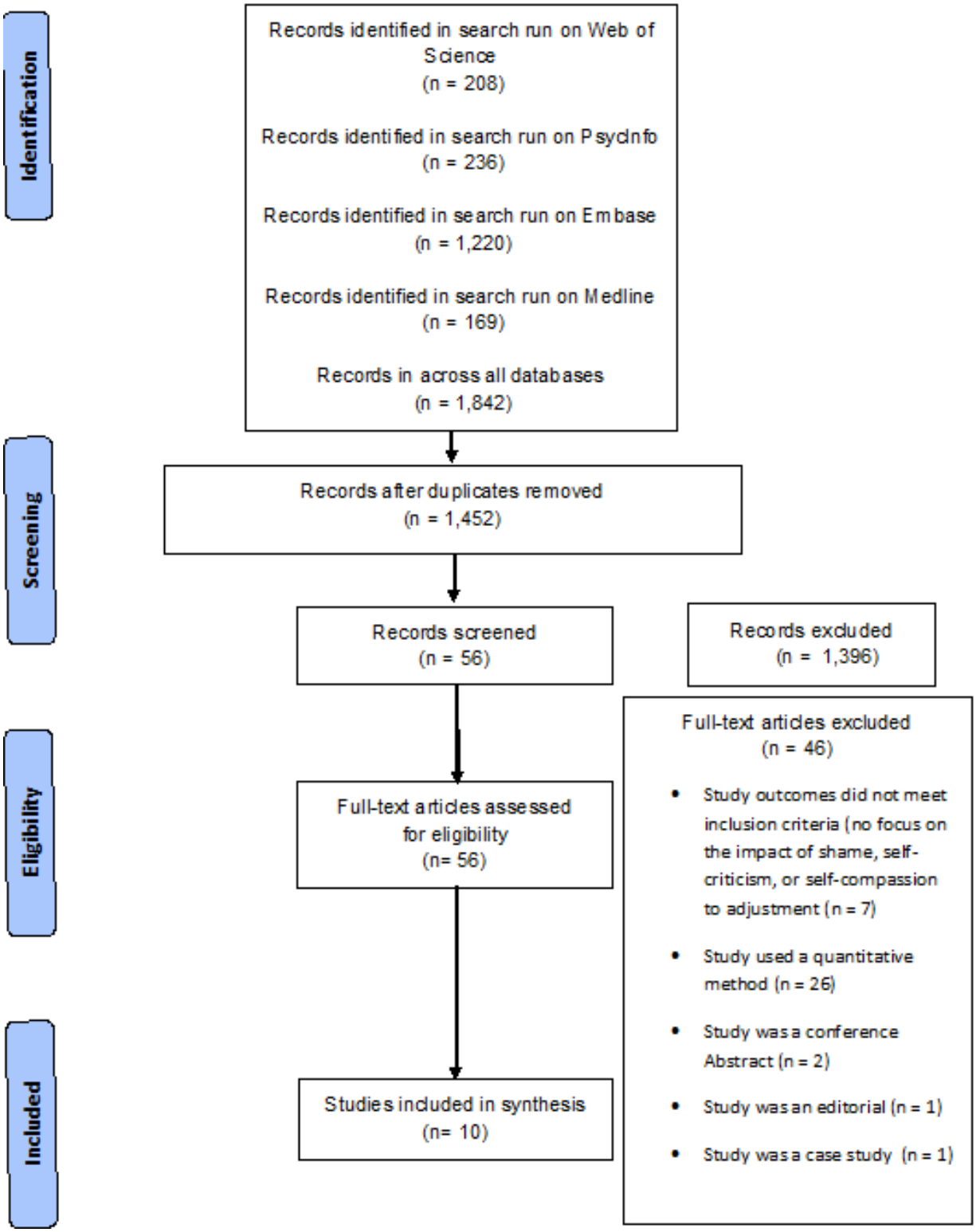

Figure 1. PRISMA Progressive Screening Process of Inclusion and Exclusion.

Table 4.

Summary of Included studies

Study	Sample	Phenomena of Interest	Design	Evaluation	Main Findings	Quality Assessment (CASP)
1. Gracey et al. (2008)	32 adults, 11 female, age 21-59 (M_{age} = 38) with ABI.	Exploring the personal constructio n of the self following acquired brain injury (Identity adjustment)	Structured group discussion (2-5 participants per group). Phenomenological (Constructivist). Thematic Analysis	Emergent themes about self-acceptance (Sub-component of self-compassion) as part of the process of identity adjustment.	30% of participants had the themes around self-acceptance as part of personal identity adjustment.	**CASP Score** 9/10 **Strengths:** Strong theoretical Grounding. Transparency used in the process of data analysis. **Limitations:** Small and narrow sample.
2. Lennon et al. (2014)	9 adults, 1 female, age 28-62 (M_{age} = 45.6) with ABI. 10 adults, 1 female, age 41-64 (M_{age} = 52.5) with SCI.	How individuals with ABI and Spinal Cord Injuries (SCI) reconstruct their sense of self (Identity Adjustment)	Phenomological Life story approach, one to one interviews. Phenomenological (Constructivist). Thematic Analysis	Emergent themes for people with ABI making positive self-construction following injury with self-acceptance (subcomponent of self-compassion).	Participants with ABI had both negative and positive self-constructions. Negative constructions were pre-injury ability compared to current ability took place. Positive when self-acceptance of current situation took place.	**CASP Score** 8/10 **Strengths:** An in-depth description of data. **Limitations:** Difficulty with generalizing to different people with head injuries due to a mixture of impairment in the

						sample. Split focus between ABI and SCI.
3. Riley & Hagger (2015)	10 adults, 1 female, age 36-66 (M_{age} = 48.7) with ABI.	The role of disclosing a stigmatized identity. Reflections on the identity adjustment of participants who suffered an ABI.	One to one interviews with participants. Phenomenological (Constructivist). Thematic Analysis .	Shame as a theme for participants not disclosing their identity.	Shame is a reason people who have suffered an ABI may not be open about their ABI with other people. This may impair their own identity adjustment. Threat avoidance may be a determining factor for the disclosure.	**CASP Rating** 10/10 **Strengths:** Presentation of results is clear and closely linked to participants comments. Clear consideration of the relationship between participants and researchers. Consideration of participant's difficulties when conducting the interview. **Limitations:** Limited generalizability (all participants had severe injuries). Resource limitations around a number of participants.
4. Gelech & Desjardins (2011)	4 adults, 1 female, age 37-55. 4-21 post-injury with ABI.	Exploring the process of reconstructing self-identity	Life history interviews and semi-structured interviews conducted with participants.	Self-compassion recognized as having a role in participants to derive inner meaning from the	Differences in how "public self" and "private self" were constructed after the injury. Emphasis on public self-being de-	**CASP Rating** 10/10 **Strength** Clear and well-

		following acquired brain injury.	Narrative Analysis	experience.	legitimized by external discourses. "Private self" adjustment was considered improved by the use of grieving, and "self-enhancement." Positive identity adjustment was noted when a shift in priority was noticed towards "morality" and "transcendence."	grounded analysis. Significant consideration made to the relationship between the researchers and **Limitations:** The unusual structure of report it difficult to extract data. A small number of participants.
5. Muenchberger et al. (2008)	6 adults, 2 females, age 22-42 (M_{age} = 35, STD: 7.56), with ABI.	The transition of identity following an ABI. Emphasis on the dynamic elements of identity adjustment.	Life story interview protocol. One to one interviews. Phenomenological (Constructivist). Thematic Analysis	Emphasis on post-injury having a period of self-acceptance (subdomain of self-compassion).	Profound identity adjustment occurs post injury which is a dynamic and ongoing process. Self-Acceptance of participants played a role at varying times (e.g., to accept the limitations of the injury).	**CASP Rating** 9/10 **Strengths** In-depth description of data analysis. Strong links to existing literature. Use of independent raters **Limitations:** Difficulty transferring findings. No reason for dropouts given.
6. Nochi (2000)	10 adults, 2 female, age 24- 54 (M_{age} = 37.5), with ABI. Time since injury	The reconstruction of self-	In-Depth 1to1 interviews, participant	Emphasis on the coping mechanisms people engage	Participants engaging in an on-going process of self-reconstruction	**CASP Rating** 9/10

	between 3 – 28 years (M_{age} = 9.5),	narratives following ABI.	observation. Grounded theory.	with. Emphasis on "Grown self" (considered an aspect of self-compassion/acceptance)	following the injury. This extends beyond uncomplicated self-acceptance. Themes include finding meaning and positivity in the injury.	**Strengths** A clear description of the recruitment strategy and reflections on the relationship between participants and **Limitations:** Highly selective sample which is unlikely to reflect the breadth of difficulties. No reason for dropouts given.
7. Jumisko et al. (2009)	8 adults, 2 females, age 29-53 (Median = 41 years old) with ABI. Time since injury between 7-15 years (Median = 10 years). 4 participants were working, one in a similar role to pre-injury.	The meaning of feeling well after the injury	1to1 interviews, adapted for people with an ABI (e.g., use of concrete questioning). Phenomenological hermeneutic analysis. Structural analysis.	Accepting their current selves (Sub-scale of self-compassion) and overcoming shame were identified as key aspects of positive identity adjustment following brain injury.	Participants needed to regain control of their lives, accept the limitations of their injury and be aware of what they could change.	**CASP Rating** 9/10 **Strengths** Careful consideration paid to the relationship between researchers and participants, as well as how their own views impacted the research question. Considered data saturation when determining the amount of data to collect. Careful consideration of bias in the data analysis.

						Limitations: Specific sample.
8. Sveen et al. (2016)	20 adults, 12 female, age 22- 60 (M_{age} = 40.3, Std = 10.3), with mild ABI. Time since injury 21-46 weeks (*Median* = 30),	The bio-graphic disruption and re-constructio n of occupation after mild TBI.	7 Focus Groups of a maximum of 4-5 participants per group. Two moderators per group. Qualitative Content analysis.	All participants expressed a sense of grieving their pre-injury self in relational to the identity adjustment following injury. Participants with a past focus (potentially self-critical) had more difficulty adjusting to the injury.	Successful integration of the past, present, and future abilities helped to restore feelings of self-worth.	**CASP Rating** 7/10 **Strengths** A clear description of the findings and the use of multiple raters. **Limitations:** Not stated if the procedure was described to participants. Limited consideration of the relationship between participants and researchers. .

9. Gill et al. (2012)	7 adults, 1 female, age 24-50 (M_{age} = 37.7), with ABI. Time since injury 10-49 years.	In-patient rehab client's perspective of rehabilitation	Single session one to one semi-structured interviews focused on the individual's personal experience of rehabilitation. Thematic analysis.	Self-acceptance was facilitated by the rehabilitation program and increased participant's confidence and ability to engage in the rehab.	Self-acceptance contributed to increased confidence and engagement in rehab. A key component for moving on was accepting the current self. Consideration around the use of Acceptance and Commitment therapy (close parallel to CFT) being useful to foster this acceptance.	**CASP Rating** 9/10 **Strengths** A clear description of data collection, good use of inter-rater reliability. Clear presentation of findings. **Limitations:** Limited consideration of the relationship between the participant's and the researchers.
10. Hooger et al. (2011)	4 adults, 1 female, age 33-61 (M_{age} = 53.5, Standard Deviation = 13.68), with ABI. Time since injury 20-27 months (M_{months} = 22.75, Standard Deviation = 3.10)	Exploration of the process of occupational struggle to gain a new identity after an ABI.	Two interviews with each participant. Open-ended questions focused on the experience of occupation and changes since the injury. The second interview focused on participants' experience of adjustment. Narrative analysis.	Different narratives about developing new self-concept through holding onto parts of the previous self and letting go of others. Self-criticism driving negative self-comparisons to pre-injury self. Self-acceptance and awareness of difficulties leading to better adaptation.	Considers the different aspects of individual's struggles to come to terms and develop a new identity after the injury.	**CASP Rating** 10/10 **Strengths** A clear description of data collection, good use of inter-rater reliability. Clear presentation of findings. Careful consideration of participant's experience of the intervention when designing the procedure. **Limitations:** Limited sample size and ability to

						generalize findings. Only a snapshot in time, which does not outline the whole part of an individuals process of adaption.
11. Freeman et al. (2015)	9 adults, 0 female, age 22-59 (M_{age} = 45.44, Standard Deviation = 10.91), with ABI. Time since injury 17months-21years.	Exploration of the lived experience of male survivors of ABI in relation to changes of personal and social identity	One to one interview, reflective journal, review of notes and self-report measures. Focus on changes to self, lifestyle and social relations. Thematic analysis.	Themes and descriptions of post-injury identity being affected by pre-injury ability, social judgements and identity, and self-comparisons.	Themes emerged that suggested, shame and self-criticism led to a negative view of self and negative self-comparisons with pre-injury self and sense of stigma.	**CASP Rating** 9/10 **Strengths** A clear description of recruitment, data collection, and analysis. Clear presentation of findings. Use of multiple raters. Data saturation considered for sample size. **Limitations:** Limited sample size and ability to generalize findings. Only a snapshot in time, which does not outline the whole part of an individuals process of adaption.

Thematic Synthesis of Results

This data was coded line by line and initially identified 63 potential codes. These codes were combined across transcripts and led to 21 descriptive themes. These themes were combined into five major descriptive themes (Table 5): Disruption to life and self, Self-acceptance, Meaning Making, Pre-Injury Focus, and Shame. This process was completed by reviewing the 21 descriptive themes repeatedly and considering areas of overlap of meaning and similarity in content, when overlap was found the themes were combined. This process resulted in five descriptive themes. This was completed in line with the process described in the data synthesis section. The themes and corresponding sub-themes are outlined below with examples from the extracted data.

Table 5

Meta-Synthesis of Themes

Descriptive Theme	Sub-themes
Disruption to Life and Self	Loss of ability and self
Self-Acceptance (Self-compassion)	Positively Revising Self Narratives Acceptance from Others
Meaning Making	Re-prioritising of Values Moral development
Pre-Injury focus	Striving to reclaim the past self
Shame	Social Stigma

Disruption to Life and Self

All studies recognised a disruption after the injury in participants' sense of themselves and their lives after ABI. The dominant impact of the injury is one of loss.

There was description of participants integrating a continuous sense of self and developing both new aspects of their identity after the injury. This process happened either by reducing pre-injury dangers or by putting participants in touch with new skills or perspectives that offered a positive sense of self post-ABI. This led to a positive construal of how the injury helped them change their lives for the better.

> *"Fred, also explained in detail that he was grateful to the woman who had hit him in the accident because he could stop illegal drugs thereafter. He admitted, ''If she didn't do what she did, I probably would be dead by now if I lived the same way I was." These informants constructed a story that their accidents brought on them new lives that they could not have expected with their pre-injury lives."*
>
> *Participant Study (6)*

Loss of ability and parts of self. A sense of loss of who they are and what they can do was a major theme in two studies and was noted in two others. It focused on aspects of the self which the injury has taken away or limited such as loss of ability to engage in certain activities, loss of valued social roles which led to a sense of loss of who they are. This was characterised by the negative appraisal of their current ability compared to their pre-injury ability.

> *"All informants expressed a sense of loss the feeling of a disruption of their former capabilities and their valued self-image…. "I used to be very active, active at work, active doing sports, well, active in general. I went from that to suddenly not bearing getting dressed, not bearing to take a shower, not bearing talking with anyone. So, this is just a completely new me, I do not recognise myself." (Informant 6, female, 45 weeks since injury, on full sick leave)"*
>
> Participant, Study (8)

Self-acceptance

Self-acceptance was a significant theme, with it being explicitly discussed in the 8 of the 11 papers. Participants described developing a sense of acceptance of the injury, as well as the limitation and consequences of the injury. The resulting restrictions on their life

and loss of certain roles were also discussed, e.g. employment and how this impacted on their sense of self.

> *They described coming to accept the loss of certain elements of the public self, and the improbability of ever regaining all their lost roles, relationships, statuses, and connections to society*
> *Study (4).*

Self-acceptance was regarded as an essential part of the change process in one study.

> *Acceptance and change were two related topics throughout the interviews and are consequently presented together. Acceptance reflects clients coming to terms with their ABI and its subsequent impact on their lives. Change defines clients' recognition of how life was different before the ABI occurred and also the change that has taken place whilst residing at the rehabilitation unit. Although change is inevitable for anyone who has sustained an ABI [3], the term here refers to clients' definition and recognition of change, which appeared to be dependent on the acceptance of their ABI.*
> *Study (9).*

Positively revising self-narratives. It was highlighted by two studies that this self-acceptance was not a straightforward process, but a complex process. It involved participant's altering their internal narratives about who they are and letting go of what they could no longer pursue due to the injury. This had a bearing on how they viewed their past, present, and future in relation to their identity.

> *People with TBI are not coping with their TBI or changed lives just by "accepting" their injuries. Instead, they seem to ultimately revise their self-narratives by changing the appearance of their past and future or their environments.*
> *Study (6).*

Acceptance from others. Acceptance from other people was key for some participants. This could be relations, friends or study staff members at a rehabilitation centre. In each case when participants described being treated with acknowledgement, kindness and acceptance, they were better able to accept the injury and integrate the ABI into their own identity.

> *"In addition, clients' sense of personal identity seemed to be related to an acceptance of their identity, by staff and clients. As the following quote demonstrates, clients felt comfortable with their identities in the context of this rehabilitation unit:*
> *"I mean, the way they [the staff] treat me now is like I'm part of the furniture. So, I think they are just so used to me now (X4)"."*
> *Participant; Study (9).*

An accepting attitude from others was not always enough to facilitate self-acceptance. Gill et al. (2012) identified one participant who was from a different culture and described not feeling accepted by the staff. This suggests there are other factors, like a sense of connectedness with the people accepting you, that make that effective.

> *"This perspective is inconsistent with how the other participants viewed the staff. However, X6 was the only participant who identified as being from a different culture. Concurrent with previous research, it has been reported that people who are from culturally and linguistically diverse backgrounds experience ABI rehabilitation differently from people who identified themselves as from the same culture that the unit was situated.."*
> *Study (9).*

Meaning Making

Meaning making was present in some form through 9 of the 11 studies. Many of the researchers noticed that participants developed new meaning in response to their injury which linked with a positive construal of their identity. This involved the development of new perspectives, optimism for the future and being kinder towards their own limitations.

> *…individuals described the experience of acquiring an injury as contributing something positive to their sense of self, such as new skills, new self-attributes or a new perspective that facilitated a re-evaluation of life-priorities*
> *Study (2).*

This meaning-making appeared to play a role in how people made sense of both the injury and themselves.

> *…individuals actively construe themselves in terms of their outlook on life,*

emotional experiences, motivation, lifestyle, and uncertainty, reflecting the range of ways in which people make sense of themselves.
Study (1).

Re-prioritization of values. A big factor that participants described as part of adjusting to the injury was altering or re-prioritizing their values. This involved letting go of pre-injury values, e.g., around employment, in favour of new opportunities or valued roles such as being a parent.

Tom, who defined himself by his social popularity preinjury, began to focus on the importance of employment to define his place in the social sphere. Barb, whose identity had revolved around her career as a school teacher, came to define herself as an advocate, volunteer, and leader for others with life-changing health problems postinjury. These examples illustrate how the nucleus of the public self can shift, allowing the survivors to manage important losses through a reconfiguration of the hierarchy between particular aspects of one's social identity.
Study (4).

Moral Development. As part of making meaning and in addition to re-prioritizing values after the injury, participants highlighted that the injury led to some moral development. Learning to redefine themselves and cope after the injury had led to them to recognise more "moral" or right ways of living as opposed to more "superficial" ways of living.

"In this way, the experience of losing certain aspects of the social self was considered an enlightening event, one that showed survivors the impermanence and emptiness of social identity markers, and the ultimate moral supremacy of the inner self."
Study (4).

Whereas was recognition of the losses of function and ability, this moral development appeared to be an opportunity to grow as a person after the injury.

"Although they were conscious of their functional changes that were apparently negative, they believed that they had been grown as seen from a moralistic point of view.
Study (6).

Pre-Injury focus

Pre-injury focus was present in five of the 11 studies. This theme was focused on when participants were making comparisons to themselves, their ability or their lives before the injury. In two of the studies, this was referred to as being linked with self-criticism.

> *His relationships with his wife, daughters, and friends have catalyzed moments of self-criticism and spurred comparisons between the man he once was and currently is.*
> *Study (10).*

This comparison was described as unpleasant and discouraging for participants, as they felt they were less able to engage in activities that helped contribute to their sense of self. Looking back at the difference in ability between now and then linked strongly to what they had lost.

> *"I used to be very active, active at work, active doing sports, well, active in general. I went from that to suddenly not bearing getting dressed, not bearing to take a shower, not bearing talking with anyone. So, this is just a completely new me, I do not recognise myself. (Informant 6, female, 45 weeks since injury, on full sick leave)*
> Participant; Study (8).

The comparison tended to be negative comparisons. With the post-injury version of themselves being viewed as worse or less than the pre-injury version of themselves.

> *"Both individuals with ABI and individuals with SCI reconstructed self-narratives that constituted a negative view of their current self in comparison to that of their pre-injured self*
> Study (2).

Striving for past self. A subtheme emerged around how some participants coped with this loss of ability or identity after injury. Some participants were described, or described themselves, as striving to regain this lost sense of self by re-gaining their ability. This striving, however, had mixed results with one study reporting this past focus led to

greater distress compared to future orientation.

> *"... but, um, it was about me and it's been all... it was always about me...wanting the old-me I des... desperate to have that old-me back..." Tony Participant Study (11)*

Shame

Shame was a theme found in five of the 11 studies and seemed to touch on a key part of the impact of the injury on the participant's identity. It related to participants feeling embarrassed or ashamed about having the injury and the difficulties the injury has brought them. This had a significant impact on how the participant's felt they were experienced by others socially, as well as affecting how they judged their own worth.

> *"My attitude is 'ooh, yeah I'll have a go at that.' And then if, and when, I find it more difficult, I will then explain why I found it more difficult. But I think it's often afterwards rather than before. I guess in a way I'm almost sort of embarrassed about having a head injury. It's a sort of... almost like a kind of black mark rather than a... certainly not something I'd want to show off about" Study (3).*

These feelings of shame were described as making it difficult for some participants to engage in social activities and to be highly self-conscious when they did.

> *Participants expressed the view that they needed courage to be with other people because of their limitations and feelings of shame. They felt well when they were with people who took them seriously, were not ashamed of them did not make too heavy demands on them and accepted that they could not always manage the things they should. Study (7).*

Sense of Stigma. Sense of stigma was a notable aspect of the shame people experienced about the injury. There was a strong sense some participants had that having an ABI is a stigmatised identity. This was consistent with other research findings of negative judgements and stigma for having disabilities (Kirsh, Sterigou, Gewurtz, Dawson, Krupa, Lysaght & Shaw, 2009), including ABI (Ralph & Derbyshire, 2013). This stigma led

to participants being uncertain about disclosing their new identity due to fear of negative judgment from others.

> *"Non-disclosure was sometimes chosen because the participants felt embarrassed or ashamed of their disability. For example, Frank did not disclose his difficulties with reading and writing because he felt 'embarrassed' about them. John said that, because of his embarrassment, he would explain about his problems to others only if he ran into difficulties:"*
> *Study (3)*

This sense of stigma impacted on how some participants constructed themselves after the injury. These negative social views appeared to be internalised to some extent, with it affecting people's sense of self following the injury.

> *None of the men identified themselves with this image, instead presenting this as a stigmatised opinion that they believed to be held by others. "...when people realised it's a brain injury they automatically think it's, you know, affected the intelligence of the person... you know, it couldn't just be, you know... there is only one type of brain injury and that's the dribbling individual in the corner... that you should feel sorry for, which is ridiculous." Stanley This perceived stigmatised view of brain injury was often mentioned in connection to a desire to appear "like a normal human being".*
> *Participant Study (11).*

Relationship Between the Themes

Drawing the identified themes together we can establish a picture of how the different themes identified relate to each other and overall contribution to the adjustment of identity following brain injury. The adjustment process is often a long and complicated process for people that is aided and hindered by the themes identified. The "Disruption to life and self" theme seemed to reflect that many participants had to adjust their sense of self after the injury, which had a range of stages. "Shame" and "past-self focus" both seemed to be factors that hindered a positive new sense of self being developed. In contrast, "self-acceptance" and "meaning-making" appeared to aid the process of identity adjustment by finding positive self-narratives. Engaging in "past self-comparisons" seemed to prevent people from developing a sense of self that went beyond the limitations

imposed by the injury. While “shame” prevented social contact and led to internalised negative de-valuing narratives about the post-injury self. In contrast, “self-acceptance” of the limitation of the injury led people to letting go of past self-expectations and develop new expectations around their post-injury opportunities and values. “Self-acceptance and “Meaning Making” also linked with each other through the sub-themes of “revising narratives about the self” and “re-prioritisation” of personal values. This process is illustrated in Figure 2, which depicts the relationship between themes.

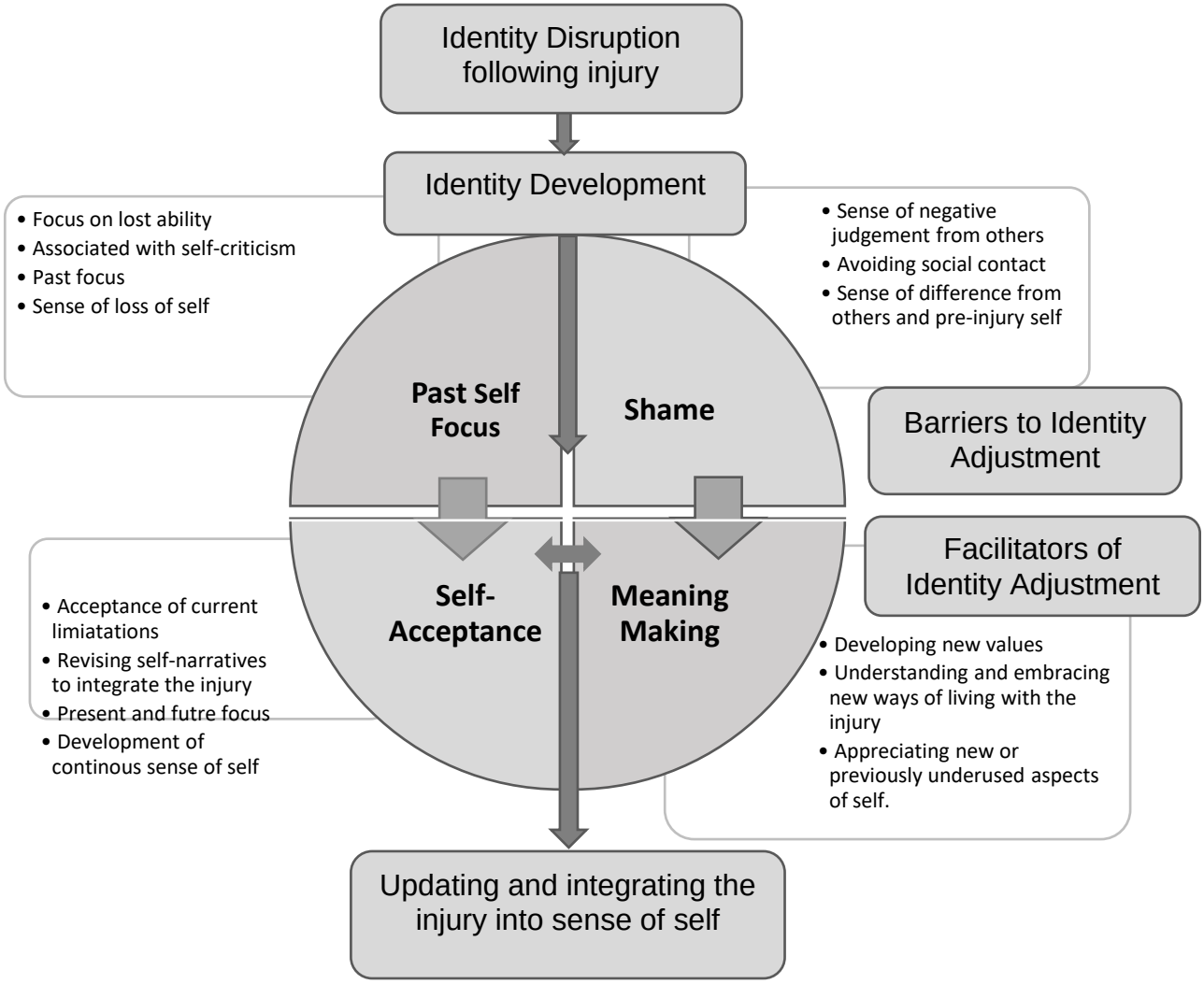

Figure 2. Thematic network of themes from the study.

Discussion

This review aimed to investigate the role of self-criticism, self-compassion, and shame for identity adjustment after ABI. Based on the Y shaped model (Gracey et al., 2009) and literature on identity adjustment (Carrol & Coetzer, 2011), it was predicted that self-compassion would act as a facilitator of identity adjustment, whilst self-criticism and shame would act as barriers.

Interpretation of Results

The thematic synthesis revealed four primary themes. Two of the themes, “self-acceptance” and “meaning-making”, were noted as facilitating positive identity adjustment following ABI for participants. In contrast, themes of “shame” and “past-self focus” were noted as preventing positive adjustment to identity following injury (See figure 2). This synthesis confirms some predictions from the Y shaped model (Gracey et al., 2009). For example, that development of a positive post-injury identity is a process in which people come to accept the current limitations of the injury, let go of past expectations and develop new values and meaning in their lives after injury.

With regards to the predictions of the present review, only shame and self-criticism were explicitly acknowledged in more than one of the papers. From how self-compassion was operationalised though, for example by noting the aspects of self-compassion like self-acceptance (Neff et al., 2007), the themes identified tie into these three factors well. “Self-acceptance” and “meaning-making” were considered reflective of key aspects of self-compassion (Gilbert & Proctor, 2006; Neff et al., 2007). The “past-self focus” theme reflected a key aspect of self-criticism: negative past or future self-comparisons (Gilbert, 2009), which was noted in two of the studies. Shame was explicitly a theme in synthesis and a theme in five of the studies. The description of the themes in those studies was generally consistent with the way it was described by Gilbert (2009).

The synthesis does not allow conclusions about the exact causal relationship for how the themes affected identity adjustment; although, from the data there appeared reports of a dynamic and complex process with different phases and stages. These fluctuations of phases of identity adaptation are in line with models of grief and bereavement (Hall, 2011), highlighting the complexity of moving on and the number of different phases involved. The way identity is adjusted both individually and within a social context within the analysis also links with literature exploring social identity theory within the context of ABI (Haslam et al., 2008). The sub-theme of Acceptance from others suggested that feeling accepted by other people, especially those viewed close to them, facilitated self-acceptance of the injury. This links with Jones et al. (2011), who found that both personal (being a stronger person after the injury) and social factors (acceptance from others) led to stronger life satisfaction and well-being post-injury.

Limitations and Strengths

The lack of explicit focus on self-compassion and self-criticism in the existing literature on ABI is a significant draw-back of this study, as it makes it difficult to draw precise conclusions about how these factors relate to identity adjustment. This is likely in part due to this term being coined relatively recently by Neff (2003); which may be why the term is not widely used within the literature. Whereas themes of “self-acceptance” and “meaning-making” reflect aspects of self-compassion, self-compassion itself is only explicitly reported in one of the papers. In a similar way, self-criticism was only mentioned directly in two papers, but the past-self focus theme can be interpreted as reflecting a key aspect of self-criticism. Further research should explicitly look at whether self-compassion affects identity adjustment in the way the thematic synthesis predicts.

Another limitation is the lack of second rater for the thematic synthesis. Second raters can be used to help increase the credibility of themes and subsequent synthesis

and can help “Triangulate” and increase the depth of the analysis (Armstrong, Gosling, Weinman & Marteau, 1997). This is especially important as the analysis in the present study was theoretically driven and thus was largely “Top-down,” increasing the impact, expectation and bias on the analysis (Braun & Clarke, 2006). While other members of the research team have read and commented on the synthesis, they were familiar with the theoretical predictions and did not engage with formal coding. To broaden and deepen the understanding of how these factors relate to identity adjustment in ABI other researchers exploring and contributing to the literature would help verify and consolidate the findings.

Most included studies referred to each other, which indicates the search strategy was effective in identifying papers related to the research question. Backward chaining and forward chaining did not identify any further papers to include. It is possible that through the lack of studies explicitly looking at the impact of self-compassion and self-criticism has led to some studies being missed.

Clinical Implications

The review and subsequent synthesis provide useful insights for clinical practice. The importance of identity adjustment towards people’s journey of adapting to the brain injury strongly suggests that this could be an area of focus for clinical work with people with ABI, specifically in the context of rehabilitation. The positive themes emerging from Gill et al. (2010) highlight how self-acceptance can facilitate and improve engagement and effectiveness of rehabilitation programs. The review also suggests that assessing the traits of self-compassion and self-criticism could help identify challenges and resources for positive adjustment in ABI. In addition, the themes of “self-acceptance” and “meaning-making” suggest that third wave approaches could be used to help address barriers to and facilitate identity adjustment following ABI. This review suggests that by identifying high levels of shame and self-criticism during assessment and accommodating for and or

addressing them would help improve rehabilitation engagement and outcome. This links with the emerging evidence for CFT (Ashworth et al., 2011; 2014) for people with ABI who are struggling to adjust to the injury. Compassion-based interventions have potential utility in facilitating this positive identity adjustment. There are also implications for how neurorehabilitation and brain injury services deliver support aiming to facilitate good adjustment to the injury. Staff training about the facilitators and barriers to identity adjustment could allow staff to tailor their input to address the barriers without inadvertently reinforcing them (e.g. encouraging people to strive for their "past-self"). Further research is required to fully explore whether attending too and addressing the barriers identified within this model lead to increased engagement and better outcomes within services which this review would predict.

Conclusion

This review aimed to explore predictions about how self-compassion, self-criticism, and shame influence identity adjustment following ABI. Four databases were searched for relevant papers, and 11 full texts were identified as meeting the criteria. The thematic synthesis from the papers identified "self-acceptance" and "moral development" as facilitators of identity adjustment and "past self-focus" and "shame" as barriers to positive identity adjustment. These broadly reflected aspects of self-compassion, self-criticism, and shame are in line with predictions from compassion literature and identity adjustment to ABI literature. This review has helped to bring together literature on identity adjustment and test predictions about how self-compassion, shame and self-criticism relate to this process. Implications for clinical practice are discussed. Future qualitative research could explicitly look at the experience of self-compassion following ABI. Additional research could also more explicitly examine the relationship between the three factors and identity adjustment.

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Appendices

Appendix A: Quality Assessment tool for qualitative studies

CASP
Critical Appraisal Skills Programme

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Summertown Pavilion, Middle Way Oxford OX2 7LG

CASP Checklist: 10 questions to help you make sense of a **Qualitative** research

How to use this appraisal tool: Three broad issues need to be considered when appraising a qualitative study:

- Are the results of the study valid? (Section A)
- What are the results? (Section B)
- Will the results help locally? (Section C)

The 10 questions on the following pages are designed to help you think about these issues systematically. The first two questions are screening questions and can be answered quickly. If the answer to both is "yes", it is worth proceeding with the remaining questions. There is some degree of overlap between the questions, you are asked to record a "yes", "no" or "can't tell" to most of the questions. A number of italicised prompts are given after each question. These are designed to remind you why the question is important. Record your reasons for your answers in the spaces provided.

About: These checklists were designed to be used as educational pedagogic tools, as part of a workshop setting, therefore we do not suggest a scoring system. The core CASP checklists (randomised controlled trial & systematic review) were based on JAMA 'Users' guides to the medical literature 1994 (adapted from Guyatt GH, Sackett DL, and Cook DJ), and piloted with health care practitioners.

For each new checklist, a group of experts were assembled to develop and pilot the checklist and the workshop format with which it would be used. Over the years overall adjustments have been made to the format, but a recent survey of checklist users reiterated that the basic format continues to be useful and appropriate.

Referencing: we recommend using the Harvard style citation, i.e.: *Critical Appraisal Skills Programme (2018). CASP (insert name of checklist i.e. Qualitative) Checklist. [online] Available at: URL. Accessed: Date Accessed.*

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Paper for appraisal and reference:

Section A: Are the results valid?

1. Was there a clear statement of the aims of the research?

Yes ☐ Can't Tell ☐ No ☐

HINT: Consider
- what was the goal of the research
- why it was thought important
- its relevance

Comments:

2. Is a qualitative methodology appropriate?

Yes ☐ Can't Tell ☐ No ☐

HINT: Consider
- If the research seeks to interpret or illuminate the actions and/or subjective experiences of research participants
- Is qualitative research the right methodology for addressing the research goal

Comments:

Is it worth continuing?

3. Was the research design appropriate to address the aims of the research?

Yes ☐ Can't Tell ☐ No ☐

HINT: Consider
- if the researcher has justified the research design (e.g. have they discussed how they decided which method to use)

Comments:

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4. Was the recruitment strategy appropriate to the aims of the research?

Yes ☐
Can't Tell ☐
No ☐

HINT: Consider
- If the researcher has explained how the participants were selected
- If they explained why the participants they selected were the most appropriate to provide access to the type of knowledge sought by the study
- If there are any discussions around recruitment (e.g. why some people chose not to take part)

Comments:

5. Was the data collected in a way that addressed the research issue?

Yes ☐
Can't Tell ☐
No ☐

HINT: Consider
- If the setting for the data collection was justified
- If it is clear how data were collected (e.g. focus group, semi-structured interview etc.)
- If the researcher has justified the methods chosen
- If the researcher has made the methods explicit (e.g. for interview method, is there an indication of how interviews are conducted, or did they use a topic guide)
- If methods were modified during the study. If so, has the researcher explained how and why
- If the form of data is clear (e.g. tape recordings, video material, notes etc.)
- If the researcher has discussed saturation of data

Comments:

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6. Has the relationship between researcher and participants been adequately considered?

Yes ☐
Can't Tell ☐
No ☐

HINT: Consider
- If the researcher critically examined their own role, potential bias and influence during (a) formulation of the research questions (b) data collection, including sample recruitment and choice of location
- How the researcher responded to events during the study and whether they considered the implications of any changes in the research design

Comments:

Section B: What are the results?

7. Have ethical issues been taken into consideration?

Yes ☐
Can't Tell ☐
No ☐

HINT: Consider
- If there are sufficient details of how the research was explained to participants for the reader to assess whether ethical standards were maintained
- If the researcher has discussed issues raised by the study (e.g. issues around informed consent or confidentiality or how they have handled the effects of the study on the participants during and after the study)
- If approval has been sought from the ethics committee

Comments:

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8. Was the data analysis sufficiently rigorous?

Yes ☐
Can't Tell ☐
No ☐

HINT: Consider
- If there is an in-depth description of the analysis process
- If thematic analysis is used. If so, is it clear how the categories/themes were derived from the data
- Whether the researcher explains how the data presented were selected from the original sample to demonstrate the analysis process
- If sufficient data are presented to support the findings
- To what extent contradictory data are taken into account
- Whether the researcher critically examined their own role, potential bias and influence during analysis and selection of data for presentation

Comments:

9. Is there a clear statement of findings?

Yes ☐
Can't Tell ☐
No ☐

HINT: Consider whether
- If the findings are explicit
- If there is adequate discussion of the evidence both for and against the researcher's arguments
- If the researcher has discussed the credibility of their findings (e.g. triangulation, respondent validation, more than one analyst)
- If the findings are discussed in relation to the original research question

Comments:

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Section C: Will the results help locally?

10. How valuable is the research?

HINT: Consider

- If the researcher discusses the contribution the study makes to existing knowledge or understanding (e.g. do they consider the findings in relation to current practice or policy, or relevant research-based literature
- If they identify new areas where research is necessary
- If the researchers have discussed whether or how the findings can be transferred to other populations or considered other ways the research may be used

Comments:

SCHOOL OF PSYCHOLOGY

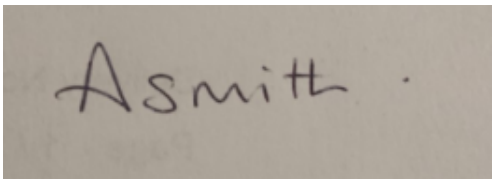
DOCTORATE IN CLINICAL PSYCHOLOGY

EMPIRICAL PAPER
Testing the effectiveness and acceptability of a digitally distributed Compassion Focused Therapy intervention for acquired brain injury using single case experimental design

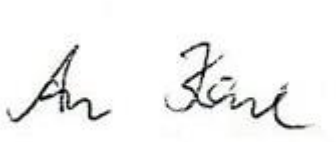
Trainee Name: **Stuart Smith**

Primary Research Supervisor: **Dr Alicia Smith**

Academic and Research Tutor Doctorate in Clinical Psychology



Secondary Research Supervisor: **Dr Anke Karl**



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Target Journal: Disability and Rehabilitation

Word Count: 7,979 words (excluding abstract, table of contents, list of figures, references, footnotes, appendices)

Submitted in partial fulfilment of requirements for the Doctorate Degree in Clinical Psychology, University of Exeter

Abstract

Purpose of Article. ABI results in a range of psychological difficulties such as identity changes and low acceptance of the limitations following injury. These factors are not well addressed by existing treatment approaches. Compassion Focused Therapy (CFT) has been promising for the ABI population in case and naturalistic studies, but its efficacy has not been studied experimentally.

Materials and Methods. The present study used a single case experimental design (SCED) to investigate if a digitally adapted guided self-help CFT protocol increases self-compassion and decreases self-criticism. In addition to being acceptable to participants and facilitating successful achievement of personal goals. Five Participants completed a five week-digitally distributed CFT course which used a mixture of psychoeducation and compassionate imagery exercises.

Results and conclusion. The study found no significant change from the baseline to intervention phase on scores of self-compassion and self-criticism. Visual analysis indicated variability in scores during the intervention as compared to the baseline for the majority of participants. Pre and post scores of self-compassion and self-criticism reliably changed in line with predictions. All participants completed the study and feedback suggested the intervention was acceptable and supportive to their recovery from the ABI. Goal-directed behaviour showed a small increase during the study. Issues around the length of the intervention and measure of self-compassion and self-criticism are discussed, as well as implications for future research and clinical practice.

Keywords: Brain Injury, Compassion Focused therapy, Single-case design, digital-intervention, guided self-help. Self-compassion, Self-Criticism.

Introduction

Consequences of Acquired Brain Injury

Injuries to the brain including traumatic and acquired brain injuries (ABI) are one of the leading causes of disability and death worldwide (Hyder, Wunderlich Puvanachandra, Gururaj, & Kobusingye, 2007). The sequelae of ABI depends on various factors including the severity of the injury, the damage to different areas of the brain, the life circumstances and the age at time of injury (Langlois, Rutland-Brown, & Wald, 2006; Mosenthal et al., 2005). People can encounter various psychological challenges with brain injury. These include mental health difficulties such as anxiety and depression; as well as non-acceptance of the long-term consequences of ABI (Ownsworth, Little, Turner, Hawkes, & Shun, 2008). Hoofien, Gilboa, Vakils, and Donovick (2001) identified half of those with an ABI in their study had elevated levels of anxiety and depression. Trans-diagnostic factors like self-criticism and shame, which underpin many mental health difficulties (Schanche, 2013), also have been observed following ABI (Freeman, Adams & Ashworth, 2015).

Psychological Therapy – Current evidence base

Psychological approaches have been adapted from mainstream mental health services for use in ABI. These adaptations include compensating for attention and memory difficulties by offering shorter sessions, providing the material in a written format and repeating the information in different ways (Anson & Ponsford, 2006; Khan-Bourne & Brown, 2003). A range of approaches have also developed an evidence base within the ABI population: including Cognitive Behavioural Therapy (CBT; Bradbury et al., 2008) and Acceptance and Commitment Therapy (ACT; Kangas & Macdonald; 2011).

CBT is the approach with the most published evidence for treating clinical levels of mood difficulties like depression or anxiety following an ABI (See Bradbury et al., 2008; Arundine et al., 2012). Though the evidence to date is mixed, for example specific types of injury like stroke have not shown benefit (Lincoln & Flannaghan, 2003). Specific cognitive

impairments, like executive functioning difficulties, also led to worsening symptoms with a CBT approach (Soo & Tate, 2007). Given the mixed evidence base, efforts have been made to explore the different factors that lead to positive or negative outcomes and whether alternative approaches might be more appropriate for some people.

Self-criticism and shame are factors which impact on the effectiveness of treatments for depression (Marshall, Zuroff, McBride & Bagby, 2008) and anxiety (Gilbert, 2000). It has been reported that self-criticism and shame are key themes following an ABI (Freeman et al., 2015) and in a case study was found to prevent engagement with CBT (Ashworth, Gilbert, & Gracey 2011). Interventions that target self-criticism and shame may prove an appropriate and effective approach for people with an ABI.

Compassion Focused Therapy

Compassion focused therapy (CFT) is an approach which addresses self-criticism and shame (Gilbert & Proctor, 2006) by utilising compassion (Gilbert, 2009a). CFT utilises imagery exercises to cultivate emotional states of compassion (Barnard & Curry, 2011), with lasting benefits to the trait of self-compassion (see Neff, 2003). These emotional states and trait self-compassion have been shown to improve overall well-being and self-regulation (Zessin, Dickhäuser, & Garbade, 2015) and increase positive affect and adaptive emotion regulation (Engen & Singer, 2015).

. Gilbert (2009a) argues that three emotion regulation systems developed in response to evolutionary pressures. The ‘threat system’ which is concerned with the detection of potentially threatening stimuli (Gruenewald, Kemeny, Aziz, & Fahey, 2004). The second is the ‘drive system’, which is concerned with motivation to attain resources (Salamone, 1994). The third emotion regulation system is the contentment and social ‘soothing system’ which Gilbert (2009a) identifies as associated with a positive calm affect, social safety and connectedness. CFT theorises that within several psychopathologies these three systems become dysregulated (Gilbert, 2009a) with individuals predominately

activating the threat or drive systems with a reduced ability to activate the compassion system.

Goal Setting and Compassion

Terry and Leary (2011) theorise that self-compassion may help overcome usual barriers to setting positive health goals, such as defensiveness, negative affect and distraction. Neff, Hsieh and Dejitterat (2005) found that people higher in self-compassion were better able to remain engaged in a course after receiving a low grade. Self-compassion also has been shown to facilitate continued engagement in goals after set back, disappointment or failure (Neely, Schallert, Mohammed, Roberts, Chen, 2009). This has important implications for people with ABI, as goal setting is considered a core aspect of the rehabilitation process (Hurn, Kneebone, & Cropley, 2006) and concern around self-incompetence and depression (Rosewilliam, Roskell, & Pandyan, 2011).

Current Evidence for CFT in ABI

CFT has an emerging evidence base for people who have sustained an ABI (Ashworth et al., 2011; Ashworth, Clarke, Jones, Jennings, & Longworth, 2014). The trans-diagnostic factors CFT works with may be suited to attending to the emotional needs and distress people often experience following ABI such as depression and anxiety (Pauley & McPherson, 2010), self-criticism, shame and challenges to self-concept (Freeman et al., 2015). A recent systematic review was conducted examining third wave therapy approaches for long term neurological conditions, including brain injury and several studies looking at CFT (Robinson, Russell, & Dysch, 2019). The papers evaluating the efficacy of CFT interventions for ABI are few and limited in methodology. Ashworth et al. (2011) published a case study that outlines the theoretical underpinnings of CFT with regards to the ABI population. In this paper, they assert that after an ABI people experience both external threat (e.g. loss of status, property etc.) and internal threat (e.g. inability to live up

to sense of self). Consequentially, the impact to their regulation systems is likely to end up having an overactive threat system and underactive soothing system.

Ashworth et al. (2011) examined the impact of CFT used with a 20-year-old woman with an ABI. She exhibited signs of psychological difficulty including depression, anxiety, self-criticism and low self-esteem. Initially, she engaged with CBT; however, after 6 sessions she reported the CBT approach wasn't working due to persistent self-critical thoughts. These self-critical thoughts were attended to using the CFT framework, using both psychoeducation and compassionate imagery exercises. The client engaged well with these sessions, reported connecting with the model emotionally and improved noticeably, with better scores on measures of anxiety, depression, anger and social communication. Another case study (Shields and Ownsworth, 2013) found a reduction in distress, lower depression and anxiety from an integrated approach of CBT, CFT and mindfulness over a total of ten sessions. Ashworth et al. (2014) conducted a naturalistic study which assessed the safety and feasibility of CFT with 12 individuals with ABI. Ashworth et al. (2014) found a mean of 16 sessions of CFT safe, feasible and acceptable. Outcome data revealed reductions in scores on anxiety, depression and self-criticism and increases in self-compassion which were sustained at 3 month follow up. Participants felt CFT had helped them to develop a new way to relate to themselves, offered tools to help with their difficulties post-injury and develop understanding and empathy for their own situation. There has been one experimental study on this topic, but it did not look at a full package CFT. O'Neil and McMillan (2012) did not find any clear benefit with a single session focused on imagery. However, this study had limited ecological validity as CFT interventions tend to occur over multiple sessions.

In summary, the evidence currently is limited to studies that are case reviews or naturalistic, with only one experimental study being used (O'Neil & McMillan, 2012). The aims, theory and research into the process underpinning CFT, however, suggest a strong

rationale for exploring CFT in ABI. Such as improving goal engagement (Neff et al., 2005), self-compassion addressing difficulties with shame and self-criticism (Gilbert & Proctor, 2006) and increasing people's ability to cope with setbacks, disappointments and social isolation (Neff, Krikpatrick, & Rude, 2007).

Developing the evidence base for CFT – Single case design

The lack of empirical studies and poor methodologies is a significant limiting factor to the existing evidence base of CFT ABI. A few methodological difficulties for assessing the efficacy of treatment within the ABI population have been identified (Perdices et al., 2006). These include difficulty recruiting large enough samples and the lack of homogeneous samples and matched controls. Perdices et al. (2006) argue that research into ABI interventions could make use of the Single Case Experimental Design (SCED) method to try and compensate for these difficulties. The advantage of this method is that it requires small numbers of participants and does not require controls. The use of phased designs and repeated observations help tackle specific threats to validity. For instance, the multiple baseline (MBD) variant of SCED uses a simultaneous replication design with randomised start points. This structure reduces the chance that changes are due to potential threats to validity; for example, history, spontaneous improvement, maturation, individual difference and/or statistical regression (Morley, 2017; Kratochwill et al., 2010).

Digital Psychological therapies and ABI

There is a growing interest in the online distribution of psychological interventions (Fairburn & Patel, 2017). There has been a range of different digital programs for difficulties like depression (Christensen, Griffiths, Mackinnon & Brittliffe, 2006). In addition, therapeutic approaches such as CBT (Andersson, & Cuijpers, 2008) have been adapted into a digital format. Whereas there is no published research on digital CFT, other third

wave approaches like ACT have been explored digitally (Trompetter, Bohlmeijer, Fox, & Schreurs, 2015).

There are many reasons why a digital intervention would suit people following an ABI. Attention and memory difficulties are common following an ABI (Mateer, Kerns, & Eso, 1996). Being able to read and access therapy material and exercises at their own pace and repeatedly may prove a real advantage for people with an ABI. Digital interventions fit well with the recommended adaptations to psychotherapy for people with ABI (Judd & Wilson, 2005) as the information recorded can be accessed as often as needed.

Aims and Hypothesis

This study aims to contribute to the emerging evidence base of CFT for people with ABI by using a single case design methodology. This novel study will contribute to the evidence base for psychological therapy following ABI by determining the causal efficacy of a 5-week CFT informed intervention. The intervention under evaluation was developed to promote self-compassion and reduce self-criticism by incorporating psychoeducation with guided imagery exercises. Secondly, it aims to explore whether a CFT based approach impacts on goal setting for people who have suffered an ABI. Finally, it hopes to determine the suitability of a digital CFT intervention with that population.

This study predicts that a 5-week digital CFT course with an ABI population will (1) increase scores of self-compassion in people who have suffered an ABI, (2) decrease scores of self-criticism, (3) assist in achievement of goals, and (4) be acceptable and suitable.

Method

Design

A multiple baseline design (MBD) variant of the SCED was used. To aid replication, the study adhered to the SCRIBE reporting guidelines (Tate et al., 2016). MBD is a replication design in which each participant starts and ends on the same dates (07-01-19 to 01-03-19) with the same number of measurement times (MT):40 per participant. These are split between the baseline phase and the intervention phase. The change between phases was randomly determined for each participant and could take place any time between the 6th MT and the 16th MT. This was designed with the minimum number of measurement points for baseline and intervention in mind (Kratochwill et al., 2010). This randomisation makes it less likely that any change in scores will be due to a specific phase change. Participants' phase change was randomly allocated using a randomisation procedure in the SCRT package for R statistical software (Bulté, I., & Onghena, P. (2009). Table 1 shows the phase change for each participant.

Table 1.

Sequence of A and B phase for individual participants.

Participant	Sequence
1	AAAAA AAAAA BBBBB BBBBB BBBBB BBBBB BBBBB BBBBB
2	AAAAA AAAAB BBBBB BBBBB BBBBB BBBBB BBBBB BBBBB
3	AAAAA AAAAA AABBB BBBBB BBBBB BBBBB BBBBB BBBBB
4	AAAAA ABBBB BBBBB BBBBB BBBBB BBBBB BBBBB BBBBB
5	AAAAA BBBBB BBBBB BBBBB BBBBB BBBBB BBBBB BBBBB

Participants

Participants were drawn from the ABI population. Two females (both who sustained traumatic head injuries) and three males (one with a traumatic head injury and two with

brain damage resulting for cardiac difficulties) were recruited through local charities, support groups, social media, private care services, word of mouth and posters. Ages ranged from 22 to 78 (*Mean* = 54.8, *SD* = 20.87). Participants had to meet the following inclusion criteria: participants were required to be 18 years or older, have sustained an ABI, have access to technology to receive emails and complete online questionnaires and be willing to set and work on a goal during the study. Participants were excluded if they met any of the following criteria: they were receiving or had received support within the past month from an NHS head injury, stroke or psychological therapy service, had profound impairment to their ability to communicate or cognition, scored above the clinical cut-off for moderately severe depression (>15) or scored above 0 on the questions related to self-harm and suicidal ideation on the Patient Health Questionnaire (PHQ-9; Kroenke, Spitzer, & Williams, 2001). All participants received their own copies of the consent and information sheet (Appendix A). Participants were all provided £25 worth of Amazon vouchers as remuneration for their participation. The study initially aimed to recruit within a single county. A low response rate from this county led to a change in the recruitment strategy. The geographical area was expanded to include the whole of the United Kingdom and Channel Islands.

Data compliance was high, with only two MTs missed across all participants. The missing data point for Participant 5 on day 2 was determined by calculating the median for the next 5 days on the relevant subscales. The missing data point for Participant 2 on day 9 was determined by calculating the median for the previous 5 days.

Measures and Materials

Screening Questionnaire (Appendix C)

PHQ-9 (Kroenke et al., 2001). The PHQ-9 is designed to assess the experience and frequency of depressive symptoms. The PHQ-9 has nine items which participants are asked to rate from 1 (Not at all) to 3 (Nearly every day) about how often over the past two

weeks they have experienced the described symptom. Scores of 15 or higher on the PHQ-9 are considered to suggest a potential diagnosis of moderate or severe depression. The PHQ-9 has demonstrated good reliability, sensitivity to change and validity (Kroenke et al., 2001).

Pre and Post-study Outcome Measures (Appendix C)

Self-compassion Scale (SCS; Neff, 2003). The SCS was designed as a self-report measure of self-compassion. The SCS has 26 items in total that generate the overall score. Each of the items is rated on a Likert scale that asks participants to rate the frequency they engage in the behaviour described in the statement, from 1 (almost never) to 5 (almost always). The SCS was found to have good test-retest reliability and be a valid measure of self-criticism (Neff, 2003).

Forms of Self-criticism/attacking & Self-Reassurance Scale (FSCRS; Gilbert, Clark, Hempel, Miles, & Irons, 2004). The FSCRS aims to assess the level of self-criticism and self-reassurance. The questionnaire has 22 statements that are split between self-attacking, self-hatred and self-reassurance subscales. For example, “I think I deserve my self-criticism” or “I am able to care and look after myself”. Participants are asked to rate the extent to which each statement is true for them on a Likert scale from 0 (Not at all) to 4 (Extremely like me). The properties of the FSCRS have been found to have good internal and test-rest reliability in both non-clinical and clinical populations (Baião, Gilbert, McEwan, & Carvalho, 2015).

Vividness of Imagery Questionnaire (VVIQ; Marks, 1973). The VVIQ aims to assess the vividness of peoples’ imagined mental images. The questionnaire has 16 questions, with each set of four questions asking participants to imagine a different mental image. The questions ask about a specific aspect of the mental image and participants are asked to rate on a Likert scale from 1 (No image at all) to 5 (Perfectly clear and as vivid as

normal vision). The VVIQ has been found to have good internal consistency (Eton, Gilner, & Munz, 1996) and acceptable but low test-retest reliability (McKelvie, 1995).

Goal Attainment Scaling (GAS; Malec, 1999). GAS goals were generated at the start of the study and rated weekly through the 8 weeks. Each participant generated one individually meaningful short-term goal that was achievable within an eight-week time scale using the GAS framework. The GAS has been used in neuro-rehabilitation settings before (Rannisto, Rosti-Otajärvi, Mäntynen, Koivisto, Huhtala, & Hämäläinen, 2015) and specifically with the ABI population (Grant & Ponsford, 2014). Participants were required to rate their progress towards their goal within a fixed time interval of a week.

Repeated Outcome Measure (Appendix D).

The 7-question repeated outcome measure was formulated for this study and aimed to assess how self-critical and self-compassionate participants feel they have been over the day. All questions are rated on a Likert scale from 1 (Not at all) to 5 (Extremely). Self-compassion was measured by 3 different questions which each ask about a different aspect of self-compassion. Phrasing for these questions was closely based on the SCS (Neff, 2003). Self-criticism was measured by 3 different questions about different aspects of self-criticism. Phrasing for these questions was closely based on the FSCRS (Gilbert et al., 2004). Internal reliability for this questionnaire was calculated by alpha's Cronbach (Bland & Altman, 1997). Self-compassion (α = .82) and self-criticism (α = .89) scales were found to have very good internal reliability.

Additional Post study questionnaire (Appendix C)

Participant feedback and reflections on the study. During the ending session, participants were given three open-ended questions about their experience of the study. The questions aimed to elicit qualitative feedback about participant experience of the intervention.

Intervention (Appendix F)

The 5-week intervention was developed from CFT material (Gilbert, 2010). It was designed to be digitally distributable by using a multi-media approach to facilitate the learning. These sessions were designed to be accessible for people with mild to moderate cognitive difficulties. This included keeping the language accessible, focusing on key points each week and reducing the length of each session. Each session starts with a 2-5 minute video recording of the lead researcher introducing the session and the key learning points. Participants are then asked to read psychoeducation material (2 A4 pages) on the topic in text and graphics. Participants also completed a guided imagery task with an audio recording guiding them through the process. Finally, participants were each allocated an optional 15-minute time slot each week, when they could call the lead researcher to reflect on and discuss the material. The minimum 5-week intervention period was chosen to balance limitations of the data collection period within the research context against the necessity to provide a minimal therapeutic intervention. Previous research using a single session with ABI participants was found to have poor outcomes (O'Neil & McMillan, 2012); while the 12-16 sessions usually used in CFT (Gilbert & Procter, 2006; Ashworth et al., 2014) was not practical within the limitations of data collection.

Procedure

Ethical approval was gained from the University of Exeter (Appendix B). Interested participants were instructed by recruitment material to email the lead researcher. A formal screening process was completed via telephone call. As part of this screening process, prospective participants completed a PHQ9 (Kroenke et al., 2001). This was to check for clinical levels of depression and risk. Participants who met the inclusion criteria then met with the lead researcher to complete the consent procedure and become familiarised with the online questionnaire system. During this process, participants read through the

information sheet before signing the consent form and completed pre-study questionnaires.

The questionnaires and intervention material were distributed to participants via email. On the phase change, participants began the intervention and were sent the material via email. Each subsequent week's material was distributed a week from the phase change. Each day participants received material and had an allocated 15-minute time slot to discuss the material via video chat. Between sessions, participants were instructed to practice the imagery exercise they received that week each day. Engagement with the materials was checked during the study via email and during skype contacts. In addition, at the end of the study participants were asked how often they were completing the imagery exercises and about their engagement with the material.

After completing the 8 weeks, a debrief session via telephone or face to face was completed. During this session, participants were asked to complete the post-study questionnaires and feedback. Participants were also informed of the objectives of the study, provided signposting for further support if required and provided a debrief sheet (Appendix G).

Data Analysis

The data analysis for this study was a mixture of visual analysis and a form of statistical analysis called randomisation tests used in SCEDs (Onghena, Vlaeyen, & De Jong, 2007). This two-method approach is in keeping with recommendations for analysing SCED data (Tate et al., 2016).

Visual analysis and randomisation tests

Visual analysis can be used to notice trends, pick up when a score begins to change and to generate evidence for a certain hypothesis being met based on this trend (Morley, 2017). This was done by graphically depicting the central tendency and trended range (Kratochwill et al., 2010).

Due to the limitations of visual analysis, randomisation tests were also used (Onghena & Edgington, 2005). The randomisation tests were conducted using R with packages designed for the analysis of single case design (Bulté & Onghena 2009). Given the number of potential randomisations, the Monte Carlo simulation test was used to assess the statistical significance at the group level (Bulté, & Onghena, 2013). Another randomisation distribution procedure was used at the individual level for individual participants. This is done by locating the observed test statistic within a randomisation distribution (Bulté, & Onghena, 2009).

Power Calculation

The number of participants was determined by estimates from Heyvaert et al. (2017), who recommends 80% statistical power for a test using a p-value of .05 is achieved by a minimum of 5 participants and 20 measurement points. In the present study power for the overall group was calculated by the number of phase changes to the power of number of participants (15/5 = 759,375). This means there are 759,375 potential random start points for the study. This gives this study sufficient power to detect a statistically significant effect at the group level (Heyvaert et al., 2017). The power for individual tests, however, is not powered at the .05 level, as the number of potential phase changes is 15, which leads to a power calculation of .067. This means there may be a greater risk of type 2 errors on the individual randomisation tests. These power calculations do not take into account effect size, as there was not normally distributed data on effect sizes for the novel measure used within the study.

Effect Size Calculation

Effect size was calculated using two separate measures which assessed the extent data between the phases overlap: Percentage Exceeding the Median (PEM) and Non-overlap of All Pairs test (NAP). The PEM is calculated by determining the number of data points the score is above or below the median from the baseline phase based on the

direction of the hypothesis (Ma, 2006). There is no clear cut off for PEM scores; however, higher % scores reflect stronger effects. The PEM was selected over the percentage of non-overlapping data (PND; Scruggs, Mastropieri, & Casto,1987) due to PEM's use of median baseline score which reduces the influence of a single extreme score in the baseline (Morley, 2019). The NAP is an effect size calculation for single case designs which is considered appropriate for all types of data (Parker & Vannest, 2009), NAP compares each point in the baseline against each point in the intervention phase. The score indicates how many interventions scores are different from baseline scores and how many are the same. Parker and Vannest (2009) suggest scores of .50 - .65 are a weak effect, .66-92 for a medium effect and .93 – 1.00 for a strong effect. The NAP was used due to having greater precision, less chance of human error in calculation and more comprehensive test of possible areas of overlap compared to other measures of effect size (Parker & Vannest, 2009). Kratochwill et al. (2010) recommend using two effect size calculations to aid with the analysis and improve confidence in the validity of the results.

Pre and Post Intervention Data

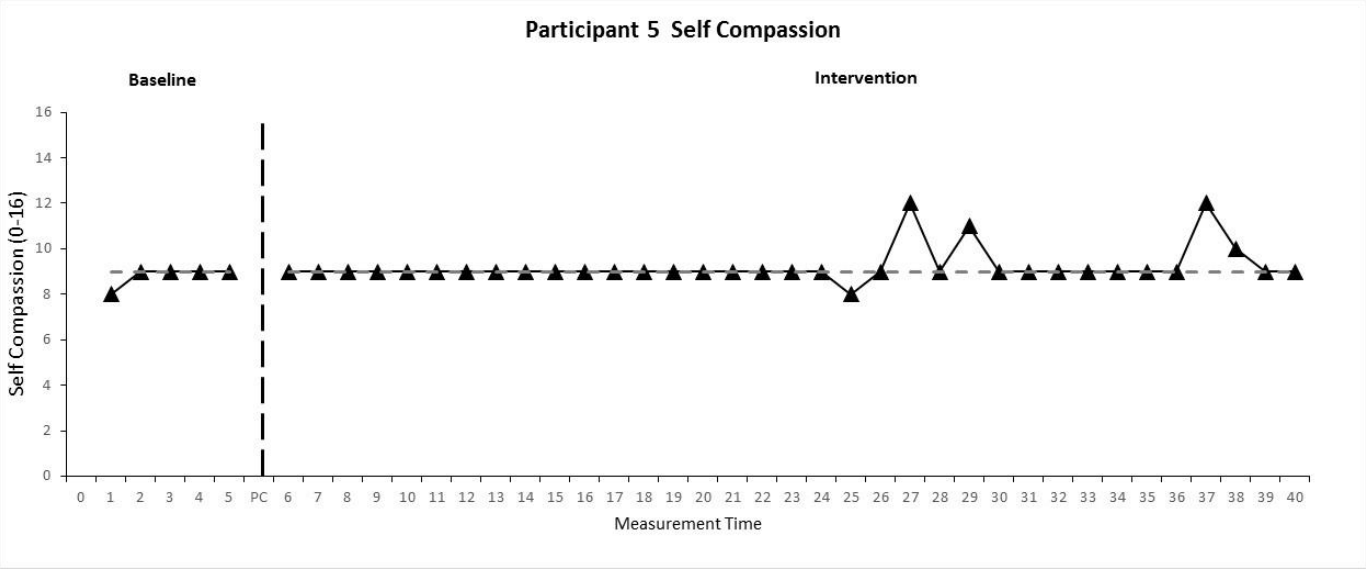
Pre and post intervention data from the pre and post questionnaires were analysed using the reliable change index (Ferguson, Robinson, & Splaine, 2002). The reliable change index is a method to establish whether an individual's score has changed in a statistically reliable way (Jacobson & Truax, 1991). Clinical cut-offs were used to determine if a change was clinically significant.

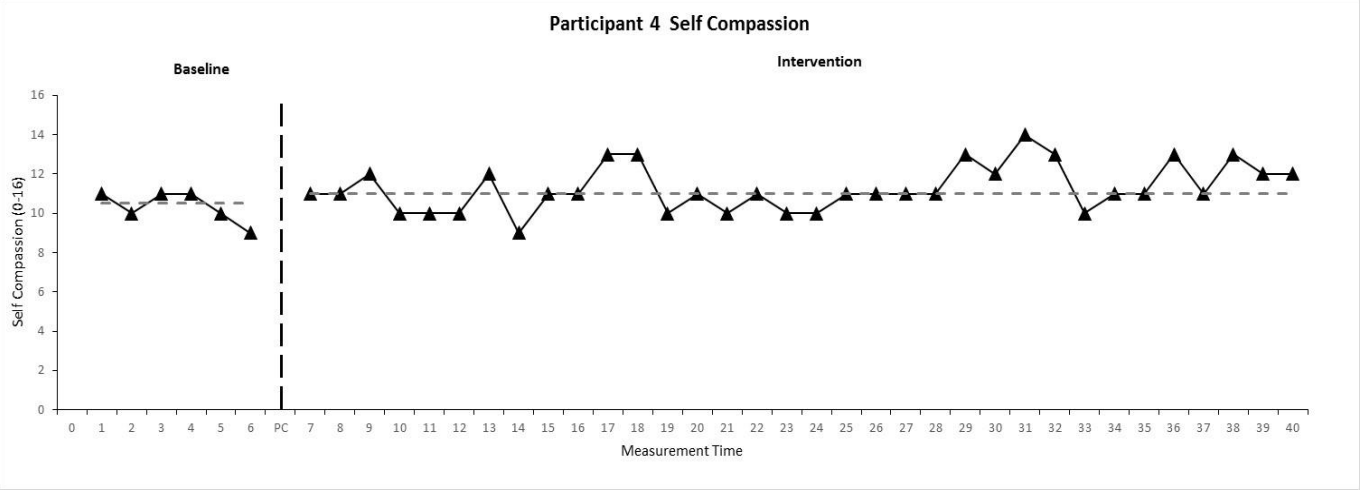
Results

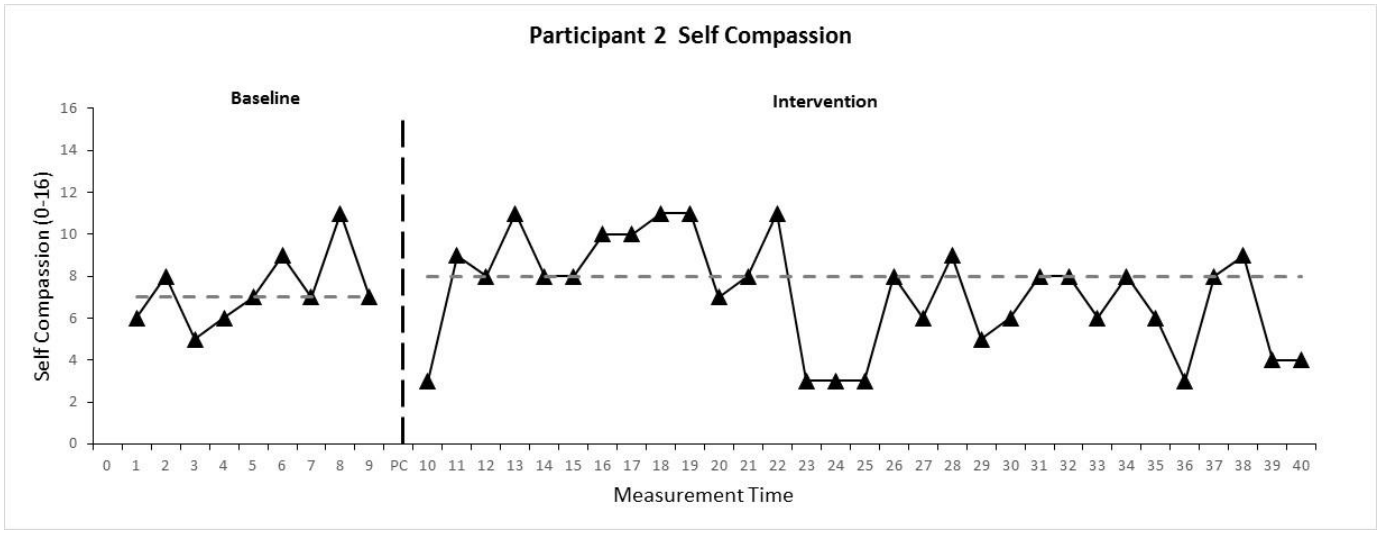
Hypothesis 1. The five-week digital CFT course would increase scores on self-compassion measures during and after the intervention compared to baseline.

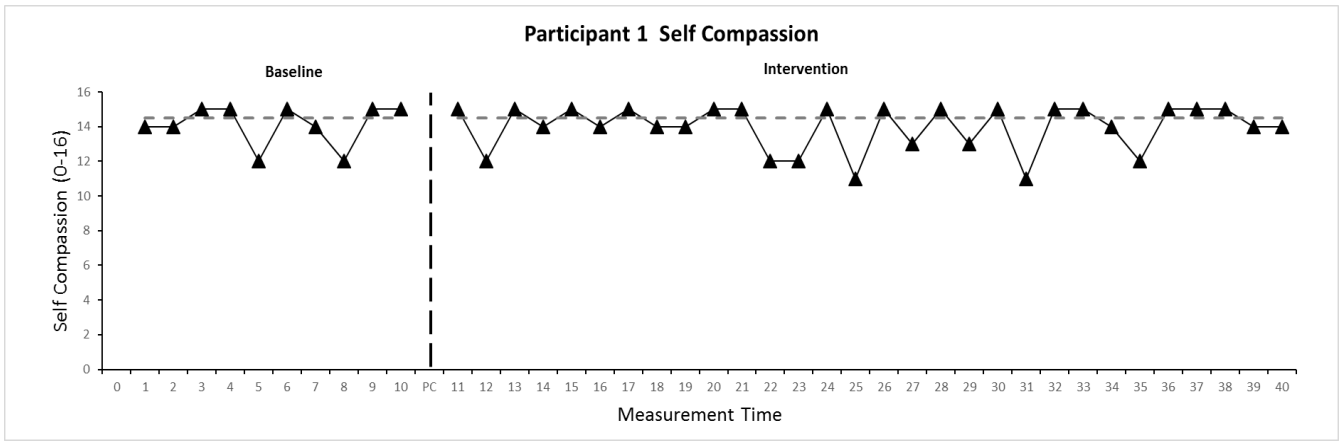
Single Case Design Analysis

At the group level, there was no statistically significant change in mean scores and only a very minor change in the median of self-compassion (*p =.602).* The effect size as measured by the NAP (NAP = .58) indicated a small effect size. Visual analysis across all participants, using the median as a central tendency, revealed that there was minimal change in central tendency between the two phases. Most participants did have greater variability in the intervention compared to baseline. For example, Participants 2, 4 and 5 had higher standard deviations and peaks and troughs on their scores during the intervention phase. This was confirmed by looking at the trended range graphs (Appendix G) for Participants 2, 4, and 5.









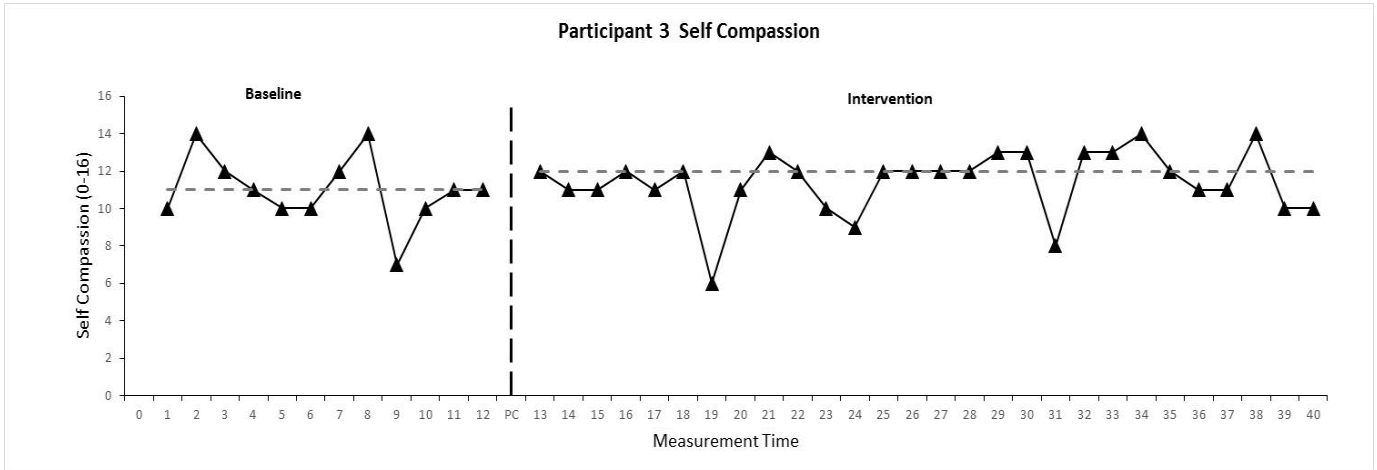


Figure 1. Visual analysis graphs for self-compassion. The dashed grey line represents the measure of central tendency used (median). Graphs are presented in order of shortest baseline to longest baseline.

Table 2.

MT Self Compassion Randomization Tests and Effect Size.

Participant	Phase A length (MTs)	Phase B length (MTs)	Phase A Mean {median} (SD)	Phase B Mean {median} (SD)	*p* value	NAP	PEM + %	Statistically significant change?
5	5	35	8.80 {9.00} (0.45)	9.23 {9.00} (0.81)	.613	.63	11.43	No
4	6	34	10.33 {10.50} (0.82)	11.29 {11.00} (1.19)	.481	.72	73.53	No
2	8	32	7.33 {7.00} (1.8)	7.16 {8.00} (2.63)	.807	.52	58.06	No
1	10	30	14.1 {14.5} (1.2)	13.97 {14.5} (1.33)	.419	.48	50	No
3	12	28	11.00 {11.00} (1.91)	11.43 {12.00} (1.75)	.548	.60	50.03	No
Group Mean	41	159	10.56 {10.50} (2.79)	10.56 {11.00} (2.79)	.602	.58	50.33	No

NAP = Nonoverlap of All Pairs a measure of effect size for SCED studies. PEM = Percentage of data points exceeding the medium.

Pre-intervention and Post-intervention Comparison

Looking at the reliable change index (See Table 3) suggests that between the beginning of the course and the end of the course there were reliable changes in self-compassion. One change was a decrease in self-compassion, which was experienced by Participant (2), this was not, however, a clinically significant decrease (See Table 3). In contrast, Participants (1) and (3) had reliable increases in self-compassion, with participant three having a clinically significant shift (moving from medium self-compassion to high self-compassion). Participant 5 moved from low self-compassion to medium self-compassion, but this improvement was not judged as reliable by the reliable change index.

Table 3.

Reliable Change Index of Self-Compassion Scale.

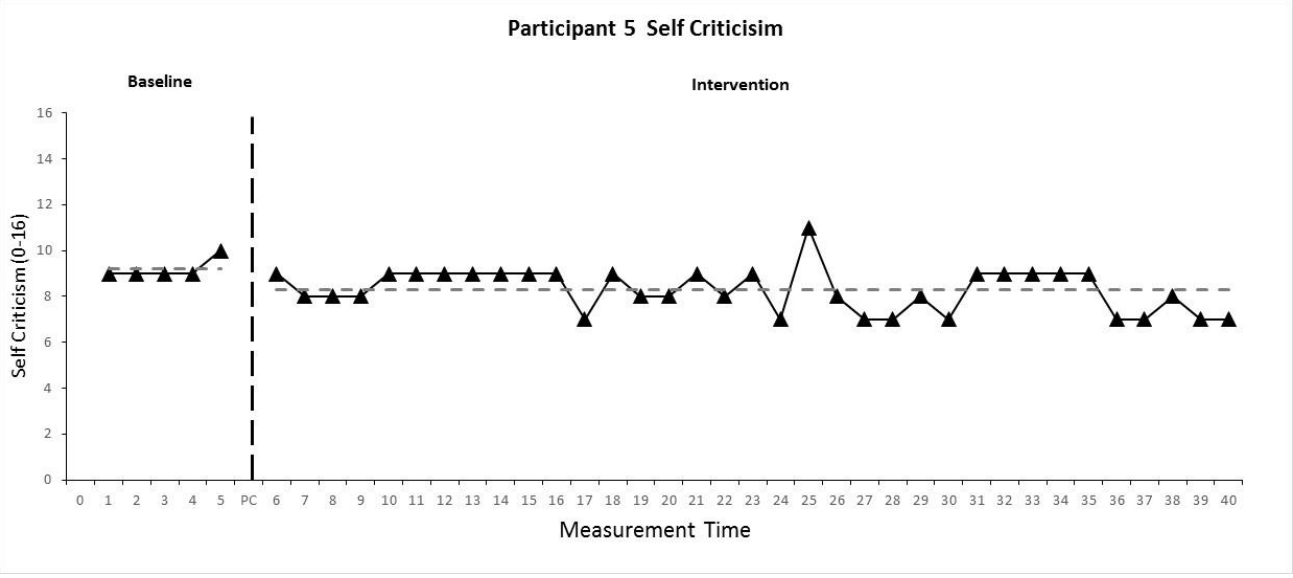
	SCS Total Mean		
Participant ID	Pre-Intervention	Post-Intervention	Diff
1	3.04	3.7	0.66*
2	3.38	2.71	-0.67*
3	2.46	3.8	1.34* **
4	2.81	3.03	0.22
5	2.31	2.54	0.23**
Group Mean	**2.80**	**3.16**	**0.36**
Group SD	**0.43**	**0.57**	
RCI Criteria			**0.52**

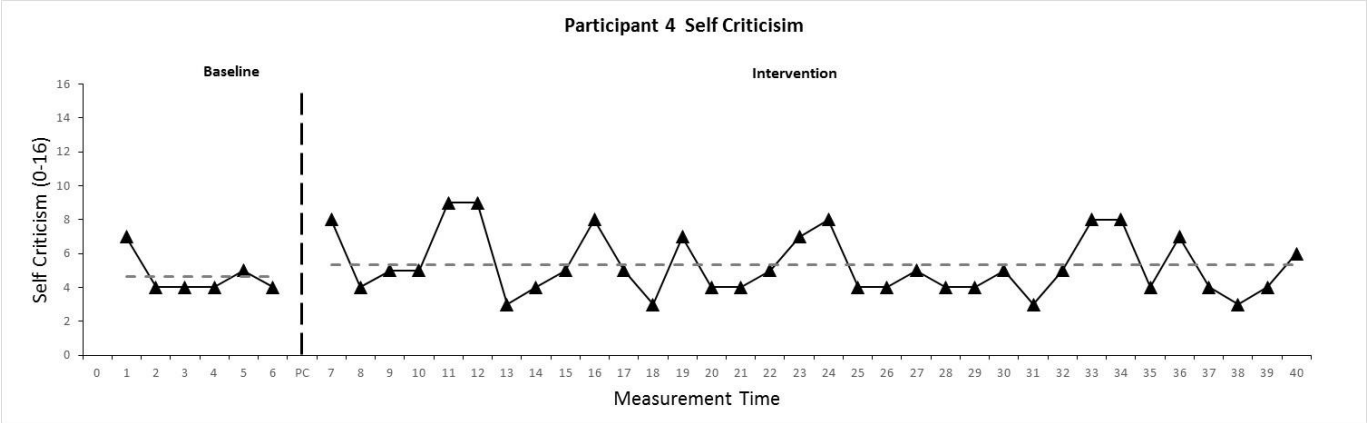
SCS = Self-compassion scale overall mean of self-compassion. RCI= Reliable Change Index, this was determined using standard deviation and alpha's Cronbach scores from the healthy controls in Werner, Jazaieri, Goldin, Ziv, Heimberg and Gross (2012). * = indicates a reliable change, ** = indicates a clinically meaningful change. The cut-off data for the self-compassion scale was taken from Neff (2003).

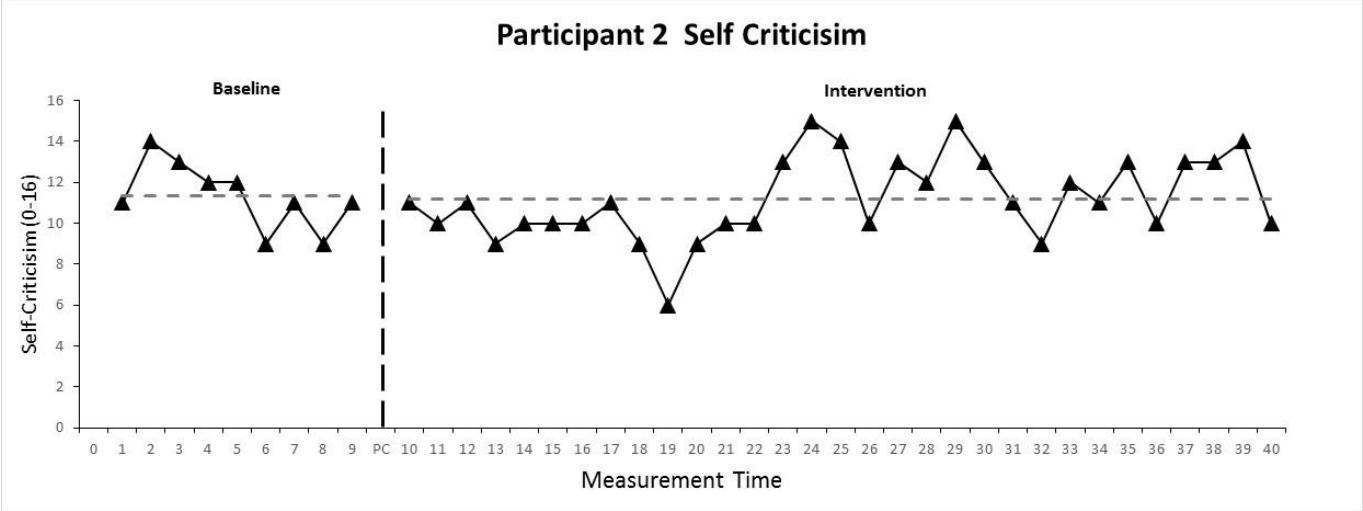
Hypothesis 2. The five-week intervention would decrease scores on self-criticism measures during and after the intervention compared to baseline.

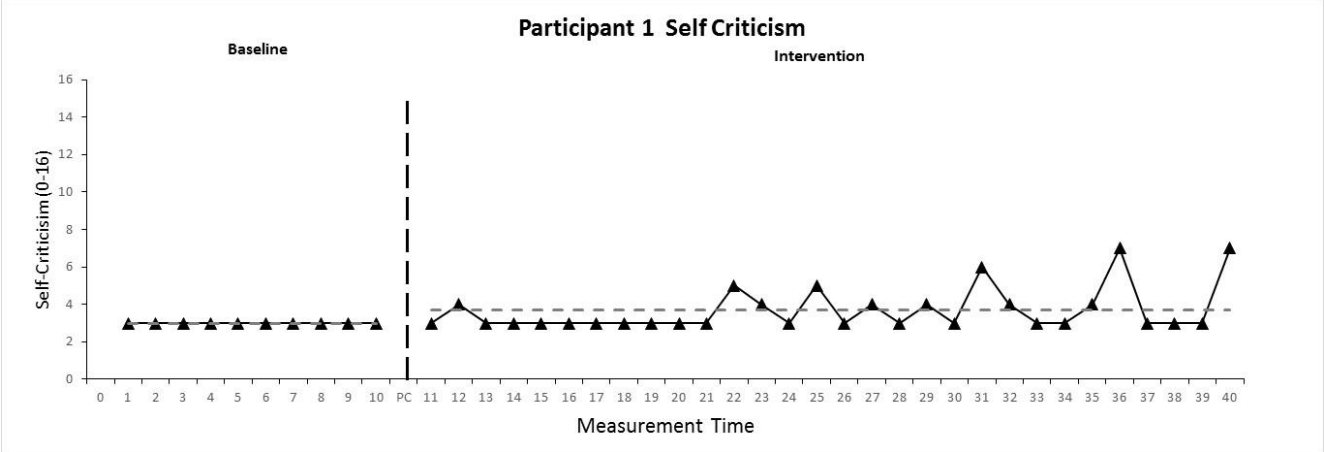
Single Case Design Analysis

At the group level, there was no statistically significant change in the mean of the self-criticism subscale from the MT questionnaire (*p =.711).* The effect size as measured by the NAP (NAP = .44) indicated a low effect size. Visual analysis using the median as a central tendency reveals that across participants there was little change in central tendency between the two phases. Most participants had higher levels of variability in the intervention phase compared to baseline. Participants 1, 2, 4 and 5 appear to have greater variability in their scores during the intervention phase. This pattern was confirmed by the trended range graphs (Appendix H) and in the higher standard deviations during the intervention phase compared to baseline.




Participant 4 Self Criticisim
Baseline
Intervention
Self Criticism (0-16)
Measurement Time


Participant 2 Self Criticisim
Baseline
Intervention
Self-Criticisim (0-16)
Measurement Time


Participant 1 Self Criticism
Baseline
Intervention
Self-Criticisim (0-16)
Measurement Time

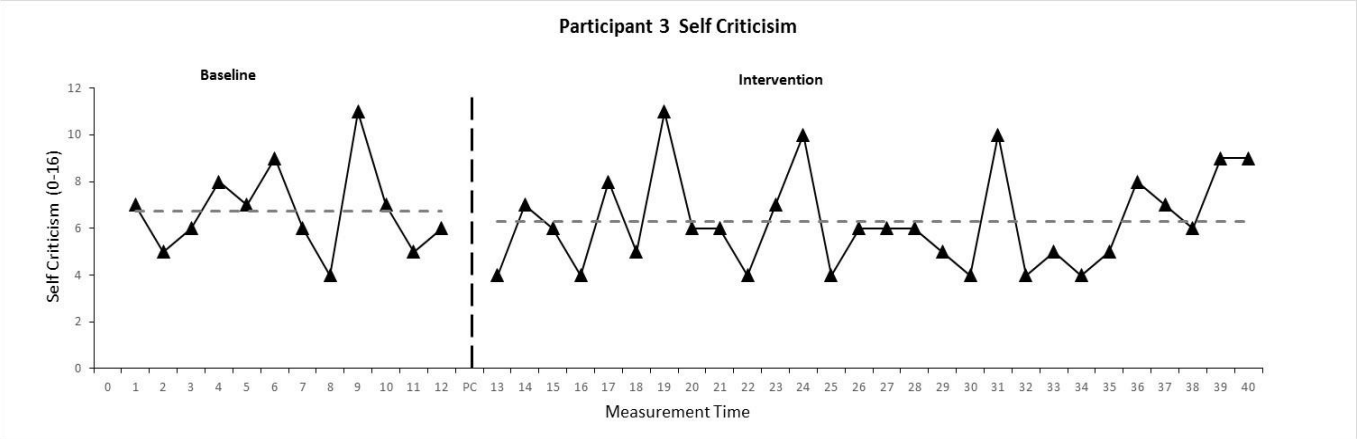


Figure 2. Visual analysis graphs for self-criticism. The dashed grey line represents the measure of central tendency used (median).

Table 4.

MT Self Criticism Randomization Tests and Effect Size.

Participant	Phase A length (MTs)	Phase B length (MTs)	Phase A Mean {median} (SD)	Phase B Mean {median} (SD)	*p* value Self Criticism	NAP	PEM- (%)	Statistically significant change?
5	5	35	9.20 {9.00} (0.45)	8.29 {8.00} (0.96)	.098	.63	51.43	No
4	6	34	4.67 {4} (1.21)	5.32 {5} (1.85)	>.999	.60	11.75	No
2	8	32	11.36 {11} (1.66)	11.19 {11.00} (2.04)	.161	.47	45.16	No
1	10	30	3.00 {3} (0)	3.7 {3} (1.18)	.290	.48	0	No
3	12	28	6.75 {6.5} (1.91)	6.29 {6} (2.07)	.226	.41	64.29	No
Group	41	159	10.56 {10.50} (2.79)	10.56 {11.00} (2.79)	.711	.44	34.53	No

NAP = Nonoverlap of All Pairs a measure of effect size for SCED studies. PEM- = Percentage of data points exceeding the median.

Pre-intervention and Post-intervention Comparison

Looking at the reliable change index suggests that between the beginning of the course and the end of the course there were reliable changes in self-criticism. There is not a fixed clinical cut off on the FSCR scale; however, judgement can be made using clinical and non-clinical means taken from Baião, Gilbert, McEwan, & Carvalho (2015) (see Table 5). Two of the subscales combine to reflect self-criticism: self-attacking and self-hatred. On the self-inadequate subscale, three participants had changes that were judged as reliable. Participants (4) and Participant (5) had reliable decreases in scores which were both clinically significant, and Participant (2) had a reliable increase which was clinically significant. On the self-hatred scale, two participants had reliable changes. Participant (5) had a reliable decrease, while Participant (2) had a reliable increase. Overall this suggests that Participants (4) and (5) had reliable decreases in self-criticism, while Participant 2 had a reliable increase. Participants (1) and (3) demonstrated a decrease on the self-inadequate subscale but maintained low scores (0 and 1) on the self-hatred subscale. In terms of self-reassurance, three participants had reliable changes. Participants (1) and (3) had reliable increases, while Participant (2) had a reliable decrease. Participants (4) and (5) both increased but not to a reliable level.

Table 5.

Pre and Post Study Scores for Forms of Self-Criticising/ Attacking Self & Reassuring Scale.

	Self-Inadequate			Self-Hatred			Self-Reassurance		
Part ID	Pre	Post	Diff	Pre	Post	Diff	Pre	Post	Diff
1	10	6	-4	0	0	0	20	34*	14*
2	14	27 **	13*	1	7	6*	24	11 **	-13*
3	13	7	-6	0	1	1	18	25	7*
4	27	17 **	-10*	5	4	-1	18	24	6
5	26	18 **	-8*	9	4	-5*	14	18	4
Group Mean	**18**	**15**	**-3**	**3**	**3.2**	**0.2**	**18.2**	**22.4**	**4.2**
Group STD	**7.91**	**8.69**		**3.94**	**2.77**		**11.45**	**8.56**	
RCI Criteria			**7.40**			**4.75**			**6.14**

RCI= Reliable Change Index. * = indicates a reliable change, ** = indicates a clinically meaningful change (e.g. moving from a normal score of self-criticism to a clinical score of self-criticism. Clinical cut off scores were taken from Baião et al. (2015). Inadequate self: clinical mean = 27.47, non-clinical mean = 17.72. Self-Hatred: clinical mean = 12.26, non-clinical mean = 3.88. Self-Reassurance: clinical mean = 10.68, non-clinical mean = 20.27

Hypothesis 3: Engaging in the 5-week CFT course would lead to higher levels of progress towards set goals at the end and during the intervention compared to baseline.

Table 6 presents GAS goal rating scores for each of the participant across the 8 weeks. Between the pre-intervention to intervention period the total GAS scores change from -6 to +1. Participant (1) was consistently making more progress towards their goal than desired from week 2 in the study until week 8 (Mode = 1). Participant (2) continued making the same level of progress from baseline until the end of the study, generally rating themselves as making slightly less progress than desired (Mode = -1). Participant (3)

generally rated themselves as making more progress than desired from week 1 to week 8 (Mode = 1). Participant (4) generally felt they were making much less progress towards their desired goal across the baseline and through the study, but during the last few weeks was making slightly less progress than desired (Mode = -2). Finally, Participant (5) reported moving from a baseline of a lot less progress than desired, to rating their progress as slightly less than desired or the desired level of progress (Mode = -1 and 0). Informal qualitative feedback from Participant (4) suggested they were making progress towards goals that were not being monitored as part of the GAS goal (quitting smoking and dieting).

Table 6.

GAS (-2 to +2) goal ratings for baseline and the 8 weeks of the study by participant.

Part ID	**Baseline**	**Wk 1**	**Wk 2**	**Wk3**	**Wk4**	**Wk5**	**Wk6**	**Wk7**	**Wk8**
1	-1	0	1	1	2	1	1	1	1
2	0	-1	-1	-1	-1	-1	-1	0	0
3	-1	1	1	1	1	0	1	2	2
4	-2	-2	-2	-2	-2	-2	-1	-1	-1
5	-2	-1	0	0	0	1	0	-1	-1
Total	**-6**	**-3**	**-1**	**-1**	**0**	**-1**	**0**	**-1**	**1**

Hypothesis 3: The 5-week CFT digitally distributed intervention will be acceptable and suitable to an ABI population.

All participants completed the intervention and engaged in practice at least 3-4 times per week suggesting the intervention had good acceptability. The use of optional skype video slots to discuss the intervention was not utilised regularly by 4 of the

participants, one participant however, used them at each available opportunity (See Table 7).

Table 7.

Participants engagement in imagery exercises and VVIQ.

Participant ID	Practice per week	No. of Skype Contacts used during intervention (0-5)	VVQ Pre score	VVQ end score
1	5-6 times per week	1	Missing Data	75
2	3-4 times per week	0	68	37
3	3-4 times per week	0	75	64
4	Every day of the week	5	80	80
5	3-4 times per week	1	55	56

Feedback at Post-Intervention

Significant life events. Four of the five participants reported significant life events. Participant (2) reported having an acrimonious divorce towards the end of the study, in which they experienced significant financial and social difficulty. Participant (3) reported travelling to the Philippines between the 3rd and 7th week and undergoing anterior cruciate ligament (ACL) reconstruction surgery during the final week. Participant (4) reported giving up smoking at the beginning of the study, making significant changes to their business and going on a diet at the end of the study. Finally, Participant (5) reported returning to work at the end of the study.

Experience of the intervention. Participant (1) reported finding the material interesting and helpful, with specific mention of the imagery exercises being relaxing and helpful to

build compassion towards themselves and others. They also commented that the pacing and distribution of therapy was easy to follow and not too time-consuming and overall rated the material as “very good and positive”. Participant (3) commented that the different elements helped them focus on their wellbeing. Participant (4) commented that they found the visualisation exercises the best aspect of the study.

Impact of the intervention on their attitude of their brain injury. Participant (1) commented that it “helped them continue their 12-year long journey to accept themselves and limitations of the injury” and helped them connect with their broader feelings about themselves. Participant (3) commented that it helped them accept the difficulties they have experienced as a result of the injury and being able to accept their own flaws. Participant (4) commented that it helped them see outside the limitations they had imposed on themselves. Participant (5) outlined that they found the concept strange but that the intervention made them realise how self-critical they had been to themselves for their whole lives and they would have found it useful during their school years. They also acknowledged that their thinking was not going to be able to change in just 5 weeks but that it had helped them develop clearer thinking and return to work.

Comments on daily reporting. Participant (1) commented that they were anticipating a longer questionnaire near the start of the study. At the end of the study however, they fed back that regularly assessing how they felt each day towards themselves was useful. Participant (5) commented that they found the number of options on the MT questionnaire too restrictive and would have found more choice on each rating helpful.

Discussion

The aim of this study was to test the efficacy and acceptability of a CFT based intervention in the ABI population using SCED. There was a specific prediction that the 5-week CFT informed intervention would lead to higher levels of self-compassion, both in the

intervention phase compared to baseline and in post-intervention scores compared to the pre-study scores. Self-criticism was also expected to decrease in both the intervention phase compared to baseline and on the post-study scores compared to the pre-study scores. Additionally, it was hypothesised the intervention would lead to improvements in goal setting and achievement and the intervention would be received as acceptable and useful to participants.

Interpretation of Findings

At the group level, there was no statistical or reliable change on measures of self-compassion or self-criticism, on either the phase data or the pre and post-study data. In contrast, the findings from individual data were mixed. The randomisation tests for all participants across both measures were non-significant. The visual analysis' using the trended range however, demonstrated that the variability of scores on self-compassion increased for Participants (5), (4) and (2) during the intervention phase compared to the baseline. For self-criticism, visual analysis with the trended range also revealed an increase in variability on the intervention phase compared to baseline for Participants (5), (4), (2) and (1). This may reflect an increased awareness of self-compassionate and self-critical tendencies during the intervention phase compared to baseline. This would fit with literature on compassion which suggests being able to be aware or mindful of these patterns of emotions is a key aspect of compassion (Neff & Lamb, 2009). It could be that developing awareness of these patterns of thinking is one of the first aspects of self-compassion improved by CFT which would fit with Gilbert's comment on the importance of mindfulness in CFT (Gilbert, 2009b). This was explicitly stated by Participant (5), who reported that the training helped them develop greater awareness of their life-long self-criticism. In addition, the pre and post-study questionnaires had findings that link to the first two hypotheses. For self-compassion, Participants (1) and (3) had reliable increases in self-compassion, whereas Participant (2) had a reliable decrease in self-compassion. For self-criticism,

Participants (4) and (5) had reliable decreases whereas Participant (2) had an increase. In contrast, Participant (2) had reliable negative changes on both.

It is important to contextualise the findings of this study as 4 out of 5 participants reported significant life events. Life events included: returning to work (Participant 5), giving up smoking (Participant 4), travelling (Participant 3) and having major surgery (Participant 3). All the events happened to participants who either increased in self-compassion (Participant 3) or decreased in self-criticism (Participant 4 & 5), suggesting improvements despite significant events. It is of interest that all participants completed the training and the study, suggesting they all had strong motivation to engage with the study and intervention. The decrease for Participant (2) is likely due to their significant life event during the middle of the study, which they shared as an acrimonious divorce. Given that divorce is considered highly challenging and threatening both financially (Zagorsky, 2005) and emotionally (Wade & Pevalin, 2004), this event is likely to have driven the decline in ratings of self-compassion and increase in self-criticism.

In summary, most participants ratings of their self-criticism and self-compassion have changed from the beginning to the end of the study, but not in a linear increase or decrease as predicted. The pre-post data do suggest four of the five participants had positive changes in their self-compassion and self-criticism. This however, cannot be directly attributed to the CFT intervention alone and may reflect other aspects of the study such as regularly reflecting on mood or engaging a guided self-help approach.

This study contributes to the emerging evidence base of CFT in ABI. It joins the case and naturalistic studies by Ashworth et al. (2011; 2014) to explore the use of CFT in the ABI population. The mixed results also link with O'Neil and McMillan's (2012) experimental study, which found a non-significant trend towards improved self-compassion from a single session focused on imagery exercises. The positive participant feedback about the

intervention further suggests it assisted with increasing self-acceptance of limitations from the injury for participants (1), (3) and (4). Self-acceptance is highlighted as an important aspect of self-compassion (Neff et al., 2007).

Acceptability. In a review by Sekhon, Cartwright and Francis (2017) they argue acceptability of health care interventions is rarely well operationalised by studies. They do recommend using the following framework: affiliative attitude, burden on participants, perceived effectiveness, ethicality, intervention coherence, self-efficacy and opportunity cost. We can determine that participants had high adherence to the measurement times and had a positive attitude towards the intervention, as participants reported it to be effective, and coherent. The fact that all the participants completed the study despite many having significant life events, combined with the above framework gives support to the hypothesis that was an acceptable intervention. The drop out was relatively lower than other online interventions (Trompetter et al., 2015), and similar to face-to-face psychotherapy interventions in the ABI population (Bradbury et al., 2008). This finding should be interpreted with caution however, due to the small numbers in the present study.

Goal Setting. This strong motivation is reflected in participant's pursuit of goal-directed behaviour during the study. On a group level, the GAS scores from baseline to the end of the study improved from -6 to +1, suggesting goal-directed behaviour slightly at a group level. On an individual level, there was a disparity between the GAS goal ratings and the qualitative feedback. Participant (4) had consistently poor goal ratings towards the CFT but in the qualitative feedback at the end of the study stated they had achieved other goals such as dieting and quitting smoking. Another participant also shared at the end of the study that they had been able to return to work. This may suggest the GAS goal rating scale did not capture the full range of goal-directed behaviour for participants. Participants engaged in goal-directed behaviour outside of their GAS goals which may have been influenced by

taking part in the intervention. This would fit with literature findings that people higher in self-compassion can adjust their priorities and set-backs in response to difficulty and flexibly set new goals (Neff et al., 2005).

The participant feedback and scores on the VVIQ suggests the participants were able to visualise well, which contributes to the knowledge about difficulties with imagery post-ABI. Previous literature has found impairments in visual imagery after closed head injuries that people who suffered a closed head injury (Richardson & Snape, 1984). Further literature revealed that this difficulty likely reflects specific damage to the hippocampus led to difficulty with engaging with imagery exercises (Hassabis, Kumaran, Vaan, & Maguire, 2007). For the present study it is likely that the participants did not have this type of damage and thus were able to engage with the imagery exercises.

Critical Appraisal

There are several limitations to the present study which are important to consider when interpreting the results. The first is that the sample used for the study is small, was highly motivated to take part in the study and is non-clinical. All participants had suffered an ABI, at various stages of their recovery and none of them had clinical depression scores. This has several implications for the transferability of results. These participant characteristics are likely to be different from typical referrals to psychology in brain injury services. Typical referrals are more likely to have clinical levels of anxiety and/or depression (Ownsworth et al., 2008) and have higher ambivalence towards treatment (Lane-Brown, & Tate, 2009). The severity of the brain injury may also be a factor important to consider, we excluded anyone with severe impairments, but the digital format likely discouraged many people with cognitive impairment from taking part. Future research should aim to recruit a

more representative sample of people with ABI to explore the clinical utility of CFT in this population better.

A significant limitation in the present study is the questionnaire used for the measurement times. This questionnaire was novel and created for the purpose of this study, with a focus on low participant burden. This questionnaire however, had limited validation data and may not have been sufficiently varied to detect changes in self-compassion and self-criticism, though the high Cronbach's Alpha scores suggest a strong degree of internal reliability. Participant (5)'s feedback about the questionnaire outlined they would have benefited from more response options on each question to consider their daily experience. Further studies using this approach should ensure their daily measure provides enough range of responses and potentially have four or five questions for each of the constructs.

Another potential limitation of this study is that the minimum intervention period was only 5-weeks, which is shorter than the average number of sessions used with CBT (Bradbury et al., 2008) and CFT (Ashworth et al., 2014) within clinical settings for ABI. In addition, the lead researcher had only a basic level of training in CFT, and a more experienced clinician using the model may have had stronger outcomes. Future research could use a clinician with more CFT training and experience and a longer intervention to better reflect clinical practice.

One of the strengths and novel aspects of this study was the nature of the distribution, the digital guided self-help approach taken seems to have been acceptable to participants. To our knowledge, this is the first time CFT has been distributed in a digital format and the first time a digital format has been used with people with ABI. It was lower than the average drop-out (35%) rate of internet interventions (Melville, Casey, & Kavanagh, 2010).

The use of SCED was also novel and successfully accommodated the difficulties surrounding recruitment of sufficiently powered samples of people with ABI. Despite challenges with recruitment, we were still able to have a powered sample with five participants at the group level. This confirms the recommendation by Perdices et al. (2006) that SCED is an approach which can navigate the challenges faced evidencing interventions in this population.

Clinical implications

This is the first time to our knowledge that a low intensity guided self-help version of CFT has been used. This contributes to existing literature of digital guided self-help psychological interventions (Fairburn & Patel, 2017). This study offers evidence that the format of multi-media guided self-help is broadly acceptable and of value to non-clinical participants with an ABI which could be used in clinical practice. This links with other 'third wave' approaches that have been successfully adapted digitally (Trompetter et al., 2015). It may also offer the possibility of a low-intensity intervention for people with ABI who may not meet the clinical criteria for higher intensity input. This fits within the move towards stepped care models psychological intervention delivery (Bower & Gilbody, 2005). In addition, a brief digital guided self-help intervention would be cost-effective (van Spijker, Majo, Smit, van Straten, Kerkhof, 2012) treatment for service users to aid with their adjustment to the injury, who may not meet the threshold for clinical psychology input. Assessing for high self-criticism and or low self-compassion during initial assessment may help to identify those who would benefit from compassion-based interventions. Assessing for the severity of the psychological need and level of self-criticism may also help determine the appropriate intensity (E.g. digital vs face to face) of compassion-based intervention. Another important clinical implication is that the use of the GAS goals in this study missed key aspects of participant's goal-directed behaviour. Further research and clinical settings may benefit from

using the GAS goal framework with multiple goals as recommended in clinical practice (Turner-Stokes, 2009).

Conclusion

This study adds to emerging evidence into CFT approaches in the ABI population. Using the multiple baseline variant of SCED, the present study tested predictions that a 5-week guided self-help CFT approach would increase self-compassion and decrease self-criticism. Whereas pre and post-intervention data supported this for four of the five participants, the SCED data were mixed. The intervention was found to be acceptable and beneficial to participants in other ways, such as increasing self-acceptance of brain injury and recognition of long-standing patterns of self-criticism. Further research using SCED, a more elaborate measure of self-compassion and self-criticism and potentially a longer intervention would help clarify the efficacy of this approach.

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Appendices

A. Information Sheet and consent form for Participants
B. Ethical Approval from University of Exeter
C. Pre and Post outcome Measures
    1. PHQ-9
    2. Self-Compassion Scale (SCS)
    3. Forms of Self Criticising/Attacking & Self Reassuring Scale (FSCRS)
    4. Adult Attachment Scale (AAS)
    5. Vividness of visual Imagery Scale (VVIQ)
    6. Goal Attainment Scale (GAS)
    7. End of Study Feedback Questions

D. Measurement time Questionnaire
E. Digital Compassion Focused Therapy course Material
    1. Link to video introduction
    2. Psychoeducation Material
    3. Scripts of imagery exercises

F. Debrief Sheet
G. Visual analysis of self-compassion scores with trended range
H. Visual analysis of self-criticism scores with trended range
I. Dissemination Statement
J. Preparation and submission requirements for *Disability and Rehabilitation.*

Appendix A: Information and consent sheet for participant.

1. Participant Information Sheet

Participant Information Sheet

Title of Project: The impact of a compassion focused therapy informed intervention on self-compassion and self-criticism in people who have had an Acquired Brain Injury (ABI).

Researcher names: Stuart Smith, Alicia Rossiter, Anke Karl

Invitation and brief summary:

We would like to invite you to take part in a research study, which is investigating if a Compassion Focused therapy based digital intervention can improve outcomes for people who have sustained a brain injury or stroke. The study takes place over 8 weeks and can be completed from your home.

Purpose of the research:

The aim of this research is to contribute to the emerging evidence of this type of psychological intervention with people who have sustained an ABI. Currently there is evidence of positive outcomes when used within clinical settings.

Why have I been approached?

You have been approached because you have sustained an ABI and either expressed an interest, or recommended as someone who may be interested by the stroke association or headway. We are aiming to recruit between 5 and 10 people with an ABI who have related goals they wish to work on. All people taking part in the study will take part in the same process.

What would taking part involve?

We will arrange to meet (for up to 60 minutes) so we can talk through what the study involves and to obtain your consent to participate in the study. You will be asked to complete some electronic questionnaires about your goals, attitude to self-compassion and experiences of imagery. These questionnaires will be repeated at the end of the intervention.

We will agree a date for you to begin completing a questionnaire 5 times per week over a 1-3 week period before starting the intervention.

The intervention involves engaging with a weekly multi media intervention package (including audio, video and text documents) which you access and view using a computer or tablet. This takes somewhere between 40 minutes and an 1 hour, which we ask you to complete the pack the same day you receive it. There is a total of 5 packs and will be sent out on the same day each week. In between packs, you will be asked to

continue completing the questionnaire and practice the imagery exercise from that week's pack. The imagery exercise will take approximately 10-minutes each time you practice it.

To enable us to see changes it is really important that you complete the questionnaire each week day. If, for any reason, a day is missed then you are simply asked to continue recording on the following day.

After completing the intervention, you will be invited to offer written feedback on the study and the material or offer this verbally to the lead researcher face to face or over skype. This conversation will be recorded to allow us to review and consider the themes from the conversation.

What are the possible benefits of taking part?

Taking part in this study gives you a chance to engage with a Compassion based therapy approach and may lead to improved wellbeing from taking part. The results of this study will help us better understand if a psychological intervention based on compassion focused therapy can help improve things people who have sustained an ABI.

What are the possible disadvantages and risks of taking part?

The daily recording over 8 weeks and practice of an exercise may be a burdensome requirement in terms of commitment and effort. You are asked 5 times a week to consider your day and your thoughts and feelings about yourself during the day, though brief this might be uncomfortable. We do not use any exercises that are designed to make you have uncomfortable thoughts. This is the only risk known to the researcher.

What will happen if I don't want to carry on with the study?

If you wish to stop taking part of this study at any point all you have to do is contact a member of the research team and let them know. You will not have to give a reason and any data we have collected at that point will be destroyed.

How will my information be kept confidential?

The University of Exeter processes personal data for the purposes of carrying out research in the public interest. The University will endeavour to be transparent about its processing of your personal data and this information sheet should provide a clear explanation of this. If you do have any queries about the University's processing of your personal data that cannot be resolved by the research team, further information may be obtained from the University's Data Protection Officer by emailing dataprotection@exeter.ac.uk or at www.exeter.ac.uk/dataprotection

All information that you provide during the intervention sessions, diary entries and questionnaires will be kept completely confidential. We may have to break confidentiality if we feel you are at risk to yourself or another person, but this will hopefully be discussed with you beforehand. A number will identify all your information ad not be associated with your name. Any forms that require your name (e.g. consent form) will be kept separately from all other material. All information provided will be kept on an encrypted/password protected electronic database on a secure computer. Any identifiable information will never be used directly in any publications or reports from this study. The anonymised data will be kept for a minimum of 10 years.

Will I receive any payment for taking part?

All participants will receive £25 in amazon vouchers or retailer of their choice as a thank you for taking part.

What will happen to the results of this study?

The research will be used as part of a doctorate in clinical psychology professional qualification with plans to submit the research to an academic journal. Identifiable information about you will not be used in any publication. If you wish to find out the results of the study, upon request these can be made available to you.

Who has reviewed this study?

This project has been reviewed by the Department of Psychology Research Ethics Committee at the University of Exeter.

Further information and contact details

If you wish to find out more about the study or take park please contact me at:

Email: ss885@exeter.ac.uk, Telephone: (Number to be confirmed).

If you are unhappy about any aspect of the study and would like to discuss it with someone other than the research team, please contact:

Gail Seymour, Research Ethics and Governance Manager

g.m.seymour@exeter.ac.uk, 01392 726621

2. Participant Consent Form

Participant Identification Number:

CONSENT FORM

Title of Project: **The impact of a compassion focused therapy informed intervention on self-compassion and self-criticism in people who have had an Acquired Brain Injury (ABI).**

Name of Researcher: Stuart Smith, Alicia Rossiter, Anke Karl.

Please initial box

1. I confirm that I have read the information sheet dated 21/07/2018 (version no. 1) for the above project. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily. ☐

2. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason and without my legal rights being affected. ☐

3. I understand that relevant sections of the data collected during the study may be looked at by members of the research team and individuals from the University of Exeter, where it is relevant to my taking part in this research. I give permission for these individuals to have access to my anonymised data. ☐

4. I understand that taking part involves completing brief questionnaire 5 times per week and practising exercises for 5 days a week (Up to 15 minutes each day). The data from the questionnaires will be stored anonymously and archived for a period of at least 10 years. I am also aware that if I complete the study I will be contacted in 3 months with an offer to complete a follow up questionnaire. I am aware I have the right to withdraw my data at any point during or after the studies completion. I consent to having the feedback discussion on the study recorded if it takes place on skype or in person. ☐

5. I agree to take part in the above project. ☐

Name of Participant	Date	Signature
Name of researcher taking consent	Date	Signature

Version Number: 1.0

Appendix B: Ethical Approval from the University of Exeter

View	Title	Status	Actions	Information	Print
eCLESPsy000114 v7.1	The impact of a Compassion Focused Therapy informed intervention on self critcism and self compassion in people who have sustained an acquired brain injury.	Complete - Out of 1 assigned reviewers, 1 outcome(s) has been recorded. Assigned to: Nick Moberly Applicant notified 14/11/2018 14:30:06	Amendment	Audit File Comments PDF	App Pack

Appendix C: Pre and Post Outcome Measures

1. PHQ-9

The Patient Health Questionnaire (PHQ-9)

Patient Name _____ Date of Visit _____

Over the past 2 weeks, how often have you been bothered by any of the following problems?	Not At all	Several Days	More Than Half the Days	Nearly Every Day
1. Little interest or pleasure in doing things	0	1	2	3
2. Feeling down, depressed or hopeless	0	1	2	3
3. Trouble falling asleep, staying asleep, or sleeping too much	0	1	2	3
4. Feeling tired or having little energy	0	1	2	3
5. Poor appetite or overeating	0	1	2	3
6. Feeling bad about yourself - or that you're a failure or have let yourself or your family down	0	1	2	3
7. Trouble concentrating on things, such as reading the newspaper or watching television	0	1	2	3
8. Moving or speaking so slowly that other people could have noticed. Or, the opposite - being so fidgety or restless that you have been moving around a lot more than usual	0	1	2	3
9. Thoughts that you would be better off dead or of hurting yourself in some way	0	1	2	3
Column Totals	_____ +	_____ +	_____	
Add Totals Together	_____			

10. If you checked off any problems, how difficult have those problems made it for you to Do your work, take care of things at home, or get along with other people?

☐ Not difficult at all ☐ Somewhat difficult ☐ Very difficult ☐ Extremely difficult

2. Self-Compassion Scale (SCS; Neff, 2003)

HOW I TYPICALLY ACT TOWARDS MYSELF IN DIFFICULT TIMES

Please read each statement carefully before answering. To the left of each item, indicate how often you behave in the stated manner, using the following scale:

1 2 3 4 5

Almost Never Almost always

_____ 1. I'm disapproving and judgmental about my own flaws and inadequacies.

_____ 2. When I'm feeling down I tend to obsess and fixate on everything that's wrong.

_____ 3. When things are going badly for me, I see the difficulties as part of life that everyone goes through.

_____ 4. When I think about my inadequacies, it tends to make me feel more separate and cut off from the rest of the world.

_____ 5. I try to be loving towards myself when I'm feeling emotional pain.

_____ 6. When I fail at something important to me I become consumed by feelings of inadequacy.

_____ 7. When I'm down and out, I remind myself that there are lots of other people in the world feeling like I am.

_____ 8. When times are really difficult, I tend to be tough on myself.

_____ 9. When something upsets me I try to keep my emotions in balance.

_____ 10. When I feel inadequate in some way, I try to remind myself that feelings of inadequacy are shared by most people.

_____ 11. I'm intolerant and impatient towards those aspects of my personality I don't like.

_____ 12. When I'm going through a very hard time, I give myself the caring and tenderness I need.

_____ 13. When I'm feeling down, I tend to feel like most other people are probably happier than I am.

_____ 14. When something painful happens I try to take a balanced view of the situation.

_____ 15. I try to see my failings as part of the human condition.

_____ 16. When I see aspects of myself that I don't like, I get down on myself.

_____ 17. When I fail at something important to me I try to keep things in perspective.

_____ 18. When I'm really struggling, I tend to feel like other people must be having an easier time of it.

_____ 19. I'm kind to myself when I'm experiencing suffering.

_____ 20. When something upsets me I get carried away with my feelings.

_____ 21. I can be a bit cold-hearted towards myself when I'm experiencing suffering.

_____ 22. When I'm feeling down I try to approach my feelings with curiosity and openness.

_____ 23. I'm tolerant of my own flaws and inadequacies.

_____ 24. When something painful happens I tend to blow the incident out of proportion.

_____ 25. When I fail at something that's important to me, I tend to feel alone in my failure.

_____ 26. I try to be understanding and patient towards those aspects of my personality I don't like.

3. Forms of Self Criticising / Attacking & Self Reassuring Scale (FSCRS; Gilbert et al., 2004)

THE FORMS OF SELF-CRITICISING/ATTACKING & SELF-REASSURING SCALE (FSCRS)

When things go wrong in our lives or don't work out as we hoped, and we feel we could have done better, we sometimes have *negative and self-critical thoughts and feelings*. These may take the form of feeling worthless, useless or inferior etc. However, people can also try to be supportive of themselves. Below are a series of thoughts and feelings that people sometimes have. Read each statement carefully and circle the number that best describes how much each statement is true for you.

Please use the scale below.

Not at all like me	A little bit like me	Moderately like me	Quite a bit like me	Extremely like me
0	1	2	3	4

When things go wrong for me:

1.	I am easily disappointed with myself.	0	1	2	3	4
2.	There is a part of me that puts me down.	0	1	2	3	4
3.	I am able to remind myself of positive things about myself.	0	1	2	3	4
4.	I find it difficult to control my anger and frustration at myself.	0	1	2	3	4
5.	I find it easy to forgive myself.	0	1	2	3	4
6.	There is a part of me that feels I am not good enough.	0	1	2	3	4
7.	I feel beaten down by my own self-critical thoughts.	0	1	2	3	4
8.	I still like being me.	0	1	2	3	4
9.	I have become so angry with myself that I want to hurt or injure myself.	0	1	2	3	4
10.	I have a sense of disgust with myself.	0	1	2	3	4
11.	I can still feel lovable and acceptable.	0	1	2	3	4
12.	I stop caring about myself.	0	1	2	3	4
13.	I find it easy to like myself.	0	1	2	3	4
14.	I remember and dwell on my failings.	0	1	2	3	4
15.	I call myself names.	0	1	2	3	4
16.	I am gentle and supportive with myself.	0	1	2	3	4
17.	I can't accept failures and setbacks without feeling inadequate.	0	1	2	3	4
18.	I think I deserve my self-criticism.	0	1	2	3	4
19.	I am able to care and look after myself.	0	1	2	3	4
20.	There is a part of me that wants to get rid of the bits I don't like.	0	1	2	3	4
21.	I encourage myself for the future.	0	1	2	3	4
22.	I do not like being me.	0	1	2	3	4

4. Adult Attachment Scale (ADS; Collins, 1996)

Adult Attachment Scale (AAS; Collins & Reed, 1990). The AAS is a scale that measures the quality of attachment in past and present relationships and uses this to predict potential attachment styles. The scale is made up of 18 questions, participants are asked to rate on a Likert scale between 1 (Not at all) and 5 (Very characteristic of me). The questions are split between three subscales anxiety, dependency and closeness. The internal reliability of the scale has acceptable internal reliability and test-rest reliability (Collins & Reed, 1990). This was used and a pre and post measure in the present study.

Adult Attachment Scale

Please read each of the following statements and rate the extent to which it describes your feelings about romantic relationships. Please think about all your relationships (past and present) and respond in terms of how you generally feel in these relationships. If you have never been involved in a romantic relationship, answer in terms of how you think you would feel.

Please use the scale below byplacing a number between 1 and 5 in the space provided to the right of each statement.

1----------2----------3----------4----------5

Not at all Very characteristic of me

(1) I find it relatively easyto get close to others. _____
(2) I do not worry about being abandoned. _____
(3) I find it difficult to allow myself to depend on others. _____
(4) In relationships, I often worry that my partner does not reallylove me. _____
(5) I find that others are reluctant to get as close as I would like. _____
(6) I am comfortable depending on others. _____
(7) I do not worry about someone getting too close to me. _____
(8) I find that people are never there when you need them. _____
(9) I am somewhat uncomfortable being close to others. _____
(10) In relationships, I often worry that my partner will not want to _____
stay with me.
(11) I want to merge completely with another person. _____

(12) My desire to merge sometimes scares people away. _____
(13) I am comfortable having others depend on me. _____
(14) I know that people will be there when I need them. _____
(15) I am nervous when anyone gets too close. _____
(16) I find it difficult to trust others completely. _____
(17) Often, partners want me to be closer than I feel comfortable being. _____
(18) I am not sure that I can always depend on others to be there when I need them _____

5. Vividness of Visual Imagery Questionnaire (VVIQ; Marks, 1973)

Vividness of Imagery Questionnaire (VVIQ)

Think of some relative or friend whom you frequently see (but who is not with you at present), and consider carefully the picture that comes before your mind's eye. Then rate the following items:

The exact contour of face, head, shoulders, and body.

Q1 No image at all (only "knowing" that you are thinking of the object)
Vague, and dim
Moderately clear and vivid
Clear and reasonably vivid
Perfectly clear and as vivid as normal vision

Q2 Characteristic poses of head, attitudes of body, etc.
No image at all (only "knowing" that you are thinking of the object)
Vague, and dim
Moderately clear and vivid
Clear and reasonably vivid
Perfectly clear and as vivid as normal vision

Q3 The precise carriage, length of step, etc., in walking.
No image at all (only "knowing" that you are thinking of the object)
Vague, and dim
Moderately clear and vivid
Clear and reasonably vivid
Perfectly clear and as vivid as normal vision

Q4 The different colors worn in some familiar clothes.
No image at all (only "knowing" that you are thinking of the object)
Vague, and dim
Moderately clear and vivid
Clear and reasonably vivid
Perfectly clear and as vivid as normal vision

Visualize a rising sun. Consider carefully the picture that comes before your mind's eye. Then rate the following items.

Q5 The sun is rising above the horizon into a hazy sky.
No image at all (only "knowing" that you are thinking of the object)
Vague, and dim
Moderately clear and vivid
Clear and reasonably vivid
Perfectly clear and as vivid as normal vision

Q6 The sky clears and surrounds the sun with blueness.
No image at all (only "knowing" that you are thinking of the object)
Vague, and dim
Moderately clear and vivid
Clear and reasonably vivid
Perfectly clear and as vivid as normal vision

Q7 Clouds. A storm blows up, with flashes of lightning.
No image at all (only "knowing" that you are thinking of the object)
Vague, and dim
Moderately clear and vivid
Clear and reasonably vivid
Perfectly clear and as vivid as normal vision

Q8 A rainbow appears.
No image at all (only "knowing" that you are thinking of the object)
Vague, and dim
Moderately clear and vivid
Clear and reasonably vivid
Perfectly clear and as vivid as normal vision

Think of the front of a shop to which you often go. Consider the picture that comes before your mind's eye. Then rate the following items

Q9 The overall appearance of the shop from the opposite side of the road.
No image at all (only "knowing" that you are thinking of the object)
Vague, and dim
Moderately clear and vivid
Clear and reasonably vivid
Perfectly clear and as vivid as normal vision

Q10 A window display including colors, shapes, and details of individual items for sale.
No image at all (only "knowing" that you are thinking of the object)
Vague, and dim
Moderately clear and vivid
Clear and reasonably vivid
Perfectly clear and as vivid as normal vision

Q11 You are near the entrance. The color, shape, and details of the door.
No image at all (only "knowing" that you are thinking of the object)
Vague, and dim
Moderately clear and vivid
Clear and reasonably vivid
Perfectly clear and as vivid as normal vision

Q12 You enter the shop and go to the counter. The counter assistant serves you. Money changes hands.
No image at all (only "knowing" that you are thinking of the object)
Vague, and dim
Moderately clear and vivid
Clear and reasonably vivid
Perfectly clear and as vivid as normal vision

Finally, think of a country scene which involves trees, mountains and a lake. Consider the picture that comes before your mind's eye. Then rate the following items

Q13 The contours of the landscape.
No image at all (only "knowing" that you are thinking of the object)
Vague, and dim
Moderately clear and vivid
Clear and reasonably vivid
Perfectly clear and as vivid as normal vision

Q14 The color and shape of the trees.
No image at all (only "knowing" that you are thinking of the object)
Vague, and dim
Moderately clear and vivid
Clear and reasonably vivid
Perfectly clear and as vivid as normal vision

Q15 The color and shape of the lake.
No image at all (only "knowing" that you are thinking of the object)
Vague, and dim
Moderately clear and vivid
Clear and reasonably vivid
Perfectly clear and as vivid as normal vision

Q16 A strong wind blows on the trees and on the lake, causing waves.
No image at all (only "knowing" that you are thinking of the object)
Vague, and dim
Moderately clear and vivid
Clear and reasonably vivid

6. Goal Attainment Scale (GAS; Coffee & Corey, 2009)

GAS Goal

You have decided on one goal for you to work towards throughout the course of the study. It is important to think about how you rate your progress on this goal.

You will be asked to provide progress ratings at time points throughout the study.

Progress the goal will be measured on a 5 point scale with the following measurements:

-2: Much less progress than desired

-1: Somewhat less progress than desired

0: Expected rate of progress

+1: Somewhat more progress than desired

+2: Much more progress than desired

For the goal consider what the desired level of progress would be. So for example if your goal is to 'go to the gym more,' your desired level of progress might be 4-5 sessions in a week. Somewhat less would be 2-3 sessions a week, much less would be 0-1 sessions a week. At the other end of the scale, somewhat more might be 6-7 sessions a week and much more might be 8-9 sessions a week. So the scale for the goal of going to the gym more would be:

-2: Went to the gym 0-1 sessions in a week

-1: Went to the gym 2-3 sessions in a week

0: Went to the gym 4-5 sessions in a week

+1: Went to the gym 6-7 sessions in a week

+2: Went to the gym 8-9 sessions in a week

Another example for the goal of 'keeping in touch with family' might be:

-2: 0-10 minutes spent in telephone conversations to home per week

-1: 11-20 minutes spent in telephone conversations to home per week

0: 21-30 minutes spent in telephone conversations to home per week

+1: 31-40 minutes spent in telephone conversations to home per week

+2: 41-50 minutes spent in telephone conversations to home per week

On the following page, you will be asked to consider how you will rate progress your goal based on the specified parameters. A good starting point will be to consider what the desired rate of progress for each goal will be, then use this as a reference point to define the rest of the rating scale. For each level of rating, try to keep the space between ratings evenly distributed without any overlap.

Goal 1 (write the goal here):_____

-2: Much less progress than desired would be:_____

-1: Somewhat less progress than desired would be:_____

0: Desired level of progress would be:_____

+1: Somewhat more progress than desired would be:_____

+2: Much more progress than desired would be:_____

Goal 1 Rating:

7. End of Study Questions.

For each question participants well able to provide free text answers.

1. Did you have any significant life events during the study? If you did please describe the event or events in as much detail as you wish to share.
2. Please write about your experience of the Compassion focused therapy material. For example, listing which aspects you found helpful or unhelpful.
3. Has engaging with the Compassion Focused therapy impacted on your view of your brain injury? If so please describe how.

How Much did you practice the imagery Exercises:

0 Times per week

1-2 Times per week

3-4 Times per week

5-6 Times per week

Every Day of the week.

Appendix D: Measurement time questionnaire.

During the day, how supportive of yourself do you feel you have been?

- Extremely
- Very
- Moderately
- Slightly
- Not at all

During the day, how angry or frustrated have you been with yourself?

- Extremely
- Very
- Moderately
- Slightly
- Not at all

During the day, how kind have you been to yourself?

- Extremely
- Very
- Moderately
- Slightly
- Not at all

During the day, how much have you noticed putting yourself down?

- Very often
- Fairly often
- Sometimes
- Rarely
- Never

During the day, how connected have you felt to other people?

- Extremely
- Very
- Moderately
- Slightly
- Not at all

During the day, how much have you liked being you?

- Extremely
- Very
- Moderately
- Slightly
- Not at all

Please Rate how stressful today has been?

- Extremely
- Very
- Moderately
- Slightly
- Not at all

Appendix E: Digital Compassion Focused Therapy Course Material

Table 7.
Summary of weekly intervention topics.

Week	Imagery Exercise	Psychoeducation
1	Soothing Breathing Compassionate Colour	What is self-compassion? Barriers to Self-compassion Mindfulness
2	Creating a safe space	Old Brain and New Brain Three systems of emotion regulation
3	The Compassionate self	Compassionate Behaviour
4	Compassion Flowing into others	Compassionate Thinking
5	Creating a compassionate ideal	Compassionate self-correction and shame-based attacking

1. Introduction Video Links

Password for all videos: study2019
Week 1: https://vimeo.com/309486123
Week 2: https://vimeo.com/309499582
Week 3: https://vimeo.com/309509744
Week 4: https://vimeo.com/311058020
Week 5: https://vimeo.com/311058714

2. Psychoeducation material

Session 1 Information Sheet

Compassion Focused Therapy (CFT) is an approach which involves:

- Developing an understanding of what compassion is and the benefits of being compassionate to ourselves
- Learning and practising to be in the moment and using imagery exercises to help develop compassion in ourselves.

This session is about introducing the idea of compassion, noticing what our expectations are and what the qualities of compassion are. The concept of mindfulness is introduced as a way of building awareness, a key part of developing compassion. Finally, we start to consider how self-criticism can get in the way of being compassionate to ourselves.

What is Compassion

Here are some thoughts other people have had about compassion, what are yours?

- Empathy and Warmth
- Being kind and considerate
- Being non-judgemental
- Understanding negative feelings

A definition of compassion by the Dalai Lama:
“Sensitivity to the suffering of self and others with a deep commitment to try to relieve it.”

Four qualities of compassion

In this approach we consider four key qualities of compassion that we aim to build on:

- Wisdom – a deep understanding of how to be and act
- Strength – The ability to put into practice what is best for ourselves and others
- Non-judgment – an openness to our experience without making assumptions
- Warmth - a gentle kindness towards ourselves others and the world.

Consider which of the qualities you feel that you have been able to connect with and which you struggle with. To help develop our ability to be compassionate and live with those qualities we need to change how we respond to our thoughts and how we act which we explore in later sessions.

Mindfulness

A starting point for this is to develop skills that allow us to be in the moment and to observe and accept our feelings: Mindfulness. Mindfulness is described as choosing to be present in the moment. As adults we often seem to be thinking of the next meeting, the shopping list, how we forgot to do something, getting caught up in the past and future. We end up on autopilot. The only time we can really change things is in the present moment; not in the past and not in the future. We can learn to be more present and practice this as a skill.

By intentionally focusing attention on the present moment, we can start to notice when we are on “auto pilot”. Being mindful, enables us to make decisions about how we respond to things in our lives. In this way we can feel more in control of ourselves without needing to control our thoughts, feelings or body. Mindfulness is in the media a lot now so you may have come across it or already used it before. Whatever your experience though, try and consider how it relates to compassion and how building mindfulness can help us be more compassionate.

A common motto people find useful when learning about mindfulness is:

Every moment is presenting me with a choice.

Barriers to compassion – Self-Criticism

It can be very difficult to feel compassion for ourselves - it is often easier to be compassionate towards other people in our lives. If your best friend came to you and told you about their emotional pain, how would you respond? Often people would be quick to offer support and compassion.

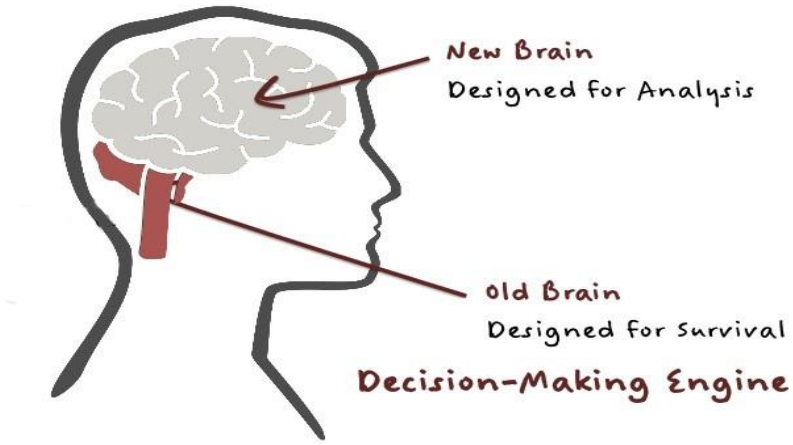
When it comes to ourselves though, we can often be harsh and critical. Have you ever noticed yourself saying things to yourself like “I am such an idiot” or “I am good for nothing”. In what kind of situations have you found yourself struggling and then saying or thinking things like that about yourself? This self-criticism adds another level of emotional pain to an already difficult situation and gets in the way of being compassionate to ourselves. Consider the role self-criticism has played in your life, when does it tend to come up?

Compassionate Focused Therapy

Session 2 Summary Sheet

Our old and new brains

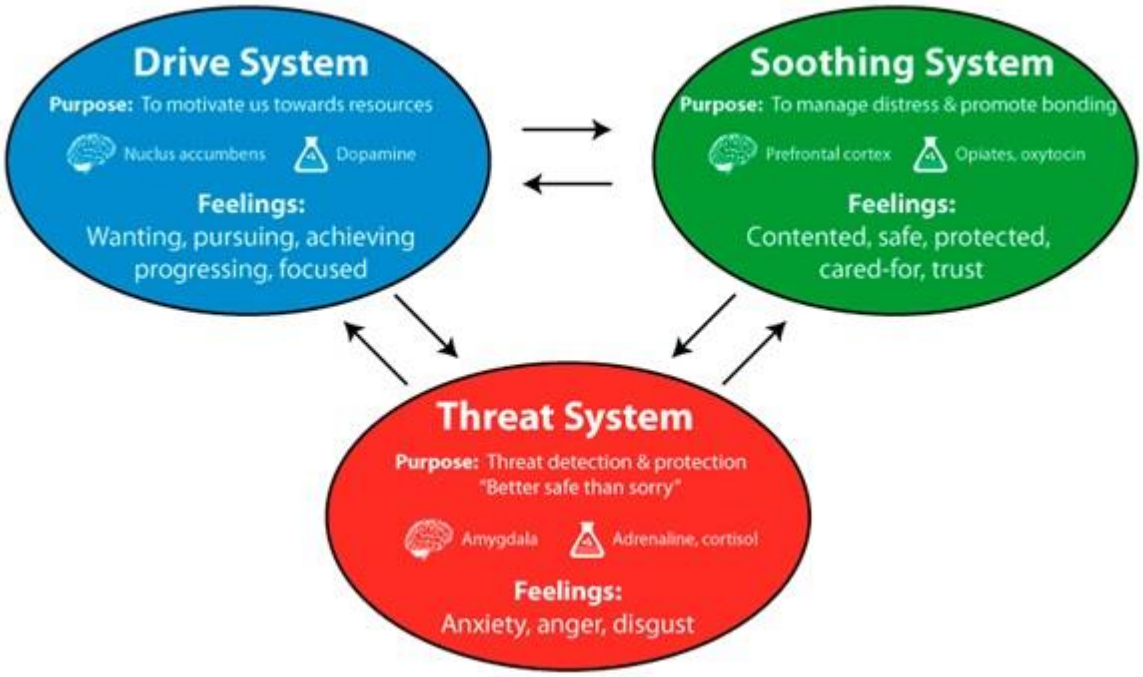
Our brains have developed over many years, some parts are older than others. Parts of our brain (the “old brain”) is focused on the basic motivations such as seeking food/shelter, making friendships, caring for our relations and reproducing. These old brain systems are tied to powerful emotions such as anger, love, fear and disgust. This “new brain” is our ability to think, worry, plan, and reflect. It can be helpful in allowing us to reflect on the past and look to the future. It can also allow us to be creative and to think and plan out solutions to problems. The problem is that it can be unhelpful when we get caught up in thinking repetitively about the past or worrying about the future.



Both parts of the brain can be helpful towards building compassion or get in the way. We can be very compassionate from our old brain by feeling that care towards or ourselves or others. We can also be compassionate from our new brain, by planning how to be compassionate or bringing compassion to our previous experiences. We can also feel angry or critical from our old brain or we can get caught in patterns of thought and planning that aren't compassionate. Consider how these different parts of the brain might play out in life and how they relate to compassion for you.

Three Emotion Regulation systems

Below a picture outlines three interacting systems that are important when thinking about compassion. This is a simplified view of what are complex systems in our brains but thinking in terms of these three systems can offer a helpful framework for exploring how our brains create different feelings, moods and desires.



Each of these systems has a key purpose in our lives. The threat system keeps us safe. The drive system gets us to go out and achieve things. Finally, the soothing system is about rest, safety and connecting with others. Everyone has each of these three systems but for some people one or two systems are more practiced or developed. Society can often encourage people to develop very good threat and drive systems, but not the soothing system.

Try and think about how well practiced each of the systems is for you. When do you notice yourself moving into one the systems? What does it feel like for you? The aim behind this approach is to work towards bringing these systems into balance. For many people that means developing the soothing system, and many of the exercises we use in this approach works towards that.

Mood states

Our moods are related to different patterns of brain chemicals, feelings and thoughts in our minds. Our moods can be affected by many things. For example, being upset over the break up or loss of a relationship or feeling exhausted and run down. In different moods different emotions can be easy to fall into – so sometimes we can just wake up feeling irritable or anxious. Moods are like patterns of our emotions. With mindfulness we can begin to be aware of what our common mood patterns are. Working on being compassionate we can be more accepting that we have these emotions, without having to be overwhelmed by them.

Compassionate Focused Therapy

Session 3 Summary Sheet

Compassionate Behaviour

We have been discussing compassion and how our brains work, the next step is to learn to develop compassionate behaviour. Our intentions and our behaviours matter, even if we don't always have the feelings to go with them. Compassionate behaviour is about doing things to help ourselves or others to deal with suffering and to get where we or they want to be. It helpful to think about our values and what it is we really want to work for. How would you like to be in six months or a year? How could you help make your hopes for yourself real? Remember to keep this compassionate, think back to trying to balance the regulation systems from last week.

Below is a list of different things people have done to practice behaving compassionately. Read through them and see which ones you might like to try, or think about what you could do to bring more compassionate action into your day to day life.

Ideas for Compassionate Action:

- Each day do one act of kindness to yourself and others – be clear that it is kindness though and not just self-indulgence.
- Each day, where possible, speak to someone – find out a little bit about them.
- Do one thing, no matter how small, that you think will help you to reach a longer term goal.
- Practice one act of forgiveness to yourself or others each day, no matter how small. Especially if you tried and you weren't as successful as you wanted to be. Or went back to an old unhelpful way of behaving you have tried to change.
- Do one thing, no matter how small, that you enjoy.
- Set time aside to practise some of your imagery exercises.
- Spend five minutes remembering a kindnesses that occurred in the day or in the past that went well.

Practice

The most important and helpful way to begin to train your mind is to change your behaviour. You might want to try doing one compassionate thing for yourself and or somebody else each day from the list above. Even if you don't feel like it. It isn't a problem if the feeling isn't there, you can still do and benefit from acting in a compassionate way.

Think about it like this, if you regularly exercise - even on those days you don't want to – you will still get fit because you're stimulating certain systems in your body. Behaving compassionately, even when we don't really want to, helps stimulate and develop compassion in ourselves.

You can become more of what you would like to be when you practice acting compassionately. You can consider how are you are going to 'feed' the three regulation systems in your brain. You can practice paying attention to what goes through your mind rather than letting it start one of its anxious or angry patterns. Remember that getting caught up in these feelings and moods is not your fault – it is the way the brain works. What we are doing is helping give the brain an alternative more compassionate way of working.

Fear of and Blocks to Compassion

Some people recognise that they are not used to a compassionate way of behaving. It seems odd to them, but they can put it into practice without much trouble. Some people though can have bigger blocks to acting or thinking in a compassionate way. They may feel they do not deserve to be compassionate, they may see it as a weakness, or a self-indulgence, or even selfishness. If these beliefs are strong, they can get in the way of practice. Think about whether you have any beliefs that stop you from trying out acting compassionately.

One way around this is to simply note these beliefs as common, but to practice anyway. Think about it like physiotherapy. If you had a weak muscle in your leg, perhaps as a result of injury, you wouldn't tell yourself that you don't deserve to have a stronger muscle. Compassion helps us to develop the courage to get where we want to be and work with things we might be avoiding. Instead of thinking of compassion as something fluffy, easy or soft, see it as how we can learn to face our anxiety and anger with kindness. To compassionately deal the difficulties and struggles of our lives.

Compassionate Focused Therapy

Session 4 Summary Sheet

Compassionate Thinking

Just as we worked on developing compassionate behaviour last week, this week is about developing compassionate thought. Some people have difficulty reflecting on their feelings and inner experiences. Sometimes this is because people are worried about 'what they might discover' or are worried about 'lifting the lid on things'. Sometimes people just feel very sad and overwhelmed, so they don't want to think too much about their feelings. They may try to push them away or cut off from them. Difficult memories may come that come up if we reflect on ourselves. Think about whether this is ever true for you, are there times you struggle to spend time with your inner world of thoughts, feelings and memories? Or are there times when it is easy?

Often people were never taught 'how' to discuss their feelings or think about them.

Sharon tells her story about her weight difficulty, how she was always given chocolate bars and crisps when she was upset. No-one ever talked to her about her what "upset" was or how to handle the feeling with care and understanding. She rarely remembers having any hugs when she was upset. It made sense to Sharon that whenever she had certain emotions she would automatically reach for the biscuits - often unaware of the emotions that were causing her distress. For Sharon her focus was always to "shut out painful things" and she used food to do it. Think about Sharon's story and see if you connect with it in any way, are there any similarities with your background or how you cope with difficult feelings?

Compassionate thinking involves slowing down and learning to become more aware of how our threat emotions, like anxiety or anger, affect our thinking. First by standing back from those emotionally driven thoughts and feelings. Then to be as kind and compassionate as we can with ourselves while we consider what the most helpful way to approach the thought and feeling is. One common technique people use when practicing this, is thinking about what they would say or do to help a friend in the same situation. Learning to stand back from our feelings and thoughts and then reacting compassionately to ourselves, is the key to training our minds. It's a big reason why it is helpful to regularly practice mindfulness and the compassionate imagery exercises we have been doing over the past few weeks.

To Help us we can ask ourselves some questions when considering our thoughts:

- Is this thinking helpful to me?
- Would I think like this if I weren't upset, anxious or angry?
- Would I teach a child or friend to think like this?
- If not, how would I like to teach them to think about these things?
- How might I think about this when I am at my compassionate best?

Consider how you practice reflecting on your thoughts and feelings like this.

Distancing and Wise Observing

There is something you may have noticed when practising the imagery exercises. When we think about or imagine something, our bodies and minds can react as though it was happening. If I picture my favourite food in front of me, making the picture as vivid as possible by imagining the sight, smell and taste, I may start to feel some of the emotions I have about that food. It's the same if I picture compassion towards myself, I may begin to feel that compassion. The same works for self-criticism though. If we practice thinking about ourselves in a self-critical way, we may end up feeling criticised and the negative emotion which that brings up.

We may have patterns of thinking or responding that is automatic and unhelpful. For example, I may have a pattern of thinking around my ability to drive. Whenever I get in a car and I make a mistake, this pattern is likely to become active and I could have thoughts like "I'm such a bad driver, what an idiot etc.". I may not even be aware that I have this pattern of thinking. That's why it is important to step from thoughts and observe them wisely.

'Wise observing' means watching our thoughts and viewing them as a stream of verbal thinking, rather than assuming they are always factual and accurate. In order to make our thinking more compassionate, we need to be able to notice when we aren't being compassionate with our thinking and consider if that way of thinking is what we want. When we have noticed, we can then try techniques to change how we react to our thoughts and feelings.

Compassionate Focused Therapy

Session 5 Summary Sheet

Working with Self-criticism

This session builds on from the compassionate thinking we looked at last week. The session is focused around understanding what self-criticism is, considering how self-criticism plays out in our lives and then considering how we can shift self-criticism to self-compassion.

If we think about criticism, most people can think of a time they were being criticised by someone. Being criticised by others isn't generally a nice experience for anyone and it is rare people would feel that this person has a right to be critical to us. There is constructive feedback we might be happy to receive from others, but harsh criticism is generally considered unfair or nasty. When it comes to ourselves though, we can be our own worst critics, we can criticise ourselves relentlessly and not think anything of it. Some people feel that self-criticism is the only way to make them do things, to succeed or be good. Some people think: "If I didn't kick myself, I'd never do anything". Or they might feel that unless they are critical and keep themselves on their toes, they could become arrogant, selfish and lazy. We know that this self-criticism can be a barrier towards developing compassion towards ourselves.

Try and consider how true this might be for you, whether there are times in your life you notice that you are more critical to yourself than usual? Generally we are more self-critical when we are stressed or threatened. Self-criticism tends to come from our threat system, we tend to be worried about something bad happening so we hope that by criticising ourselves we can prevent it. We may even have learnt this from other people in our lives, maybe a parent or a teacher from our childhood. People can become well practiced at self-criticism and self-punishment as the main way to get what they need.

Self-criticism is not a compassionate approach. Think back to how you would try help someone you cared about. The compassionate approach is to take responsibility and try to improve things for ourselves as best we can, by learning from and working with our mistakes. If we just get lost in self-criticism and feelings of anger, frustration or disappointment, we will only beat ourselves up rather than improve. That is why it is important to distinguish shame-based self-criticism from compassionate self-correction.

Compassionate Self-Correction is Focused on:	*Shame Based Self-Attacking is Focused on:*
• The desire to improve • Growth and enhancement • Forward-looking • Giving with encouragement, support and kindness • Building on positives (e.g. seeing what one did well and then considering learning points) • Focusing on attributes and specific qualities of self • Focusing and hope for success • Increasing the chances of engage	• The desire to condemn and punish • Punishing past errors and often backward looking • Giving with anger, frustration, contempt and disappointment • Focusing on deficits and fear of exposure • Focusing on self as a global sense of self • Focusing on high fear of failure • Increasing chances of avoidance and withdrawal

You can see that self-criticism is associated with threat-based emotions like anger and fear. Compassionate self-correction is based on being open-hearted and honest about our mistakes with a genuine wish to improve and learn from them, the emotions are care and compassion. Think back to the teachers from last week, which teacher would you prefer to teach your child, the critical or caring one? Which do you think will improve the child's confidence and desire to learn? Compassionate self-correction is about being open to all our weaknesses and limitations but with a real wish to improve. Try and consider how you might be able to take the idea of compassionate learning and compassionate self-correction in your life? Consider ways of working this in with the compassionate behaviour and thinking from the previous weeks.

Bringing it all together and keeping it going

We have come to the end of the 5 weeks of sessions with new material, but cultivating compassion in our lives, behaviours and thinking takes time. I hope you can continue to consider these ideas, use the exercises and build compassion into your day to day life.

Remember that it is a journey with many ups and downs. Sometimes we can drift from compassionate principals and intentions. Life can get in the way, it can become stressful and busy. Learning to come back to these ideas after drifting is an important skill to practice. I invite you to keep these materials and revisit them when you feel you could benefit from them again. Remember that practicing the imagery

exercises regularly is a great way to keep our “compassionate muscles” well-conditioned. I wish you the very best whatever the future holds.

3. Imagery Exercises Scripts

Week 1. Soothing Breathing Rhythm and Colour of Compassion

Exercise 1 Soothing Breathing

Okay, now that you are sitting comfortably, place both feet flat on the floor about shoulder’s width apart and rest your hands on your legs. Close your eyes, or look down at the floor if you prefer. Allow yourself to have a gentle facial expression may be a slight smile.

Now what we can do is just gently focus on our breathing. As you breathe try to allow the air to come down into your diaphragm (that’s just at the bottom of your ribcage in the upside down ‘V’). Feel your diaphragm, the area underneath your ribs, move as you breathe in and out. Just notice your breathing and play an experiment with your breathing. Breathe a little faster or a little slower until you find a breathing pattern that, for you, seems to be your own soothing, comforting rhythm. It is like you are checking in, linking up, with the rhythm within your body that is soothing and calming to you.

What you will usually find is that your breathing is slightly slower and deeper than normal. The in-breath is about 3 seconds … hold … and then take 3 seconds for the out-breath. Ensure that the breaths in and out are smooth and even. So, for example, notice if you’re breathing in a bit too quickly or collapsing the out breath.

Now we can spend a little while – for as long as we wish - just focusing on our breathing, just noticing the breath coming down into the diaphragm, your diaphragm lifting and then the air moving out, through your nose. Sometimes it’s useful to focus on the point just inside the nose where the air enters. So, breathing in, pausing and then breathing out, breathing in, pausing, and then breathing out……...Just focus on that for a while……

Now we can just ‘ground ourselves for a moment’. So turn your attention to your body. Sensing the weight of your body resting on the chair and the floor underneath

you…. Allowing yourself to feel held and supported…..coming to rest…in the present moment….

Remember that it is perfectly ok for your mind to wander. Simply notice it happening with curiosity about where your mind has gone and then gently guide your attention back to an awareness of your body as best as you can. Now just sense the flow of air coming in and out of your nostrils….just gently observing….no need to change anything…..just allowing things to be as they are.

When you feel ready, slowly open your eyes and bring yourself back to the present moment. Sometimes it helps if you just have a gentle stretch and a deep breath to prepare you to carry on with your day.

Exercise 2 Colour of Compassion

Engage in your soothing rhythm breathing and, when you're ready, imagine a colour that you associate with compassion, or a colour that conveys some sense of warmth and kindness. Again, it might only be a fleeting sense of colour but when you are ready, imagine your compassionate colour surrounding you. Then, imagine this entering through your heart area and slowly through your body. Or you might prefer to think of colour like a mist or light that just flows though you. As this happens try to focus on this colour as having wisdom, strength and warmth, with a key quality of total kindness. Create a facial expression of kindness on your own face as you do this exercise.

Now, as you imagine the colour flowing through you focus on the feeling that the sole purpose of this colour is to help you, to strengthen you and support you.

Week 2: Creating a Safe Space
Exercise 3 Creating a Safe space

Engage in your soothing rhythm breathing and when you're ready try to create a place in your mind – a place that could give you the feeling of safeness and calmness.

- Imagine looking around you, what can you see? It might be a beautiful wood where the leaves of the trees dance gently in the breeze. Powerful shafts of light caress the ground with brightness. Or it may be a beautiful beach with a crystal blue sea stretching out to the horizon where it meets the ice blue sky. Or relaxing next to a log fire.
- Now focus on what you can feel, like the sensation of the sun on your face or a breeze caressing your hair. Or can you feel soft, white fine sand underfoot, which is silky to the touch.
- Next think about what you can hear. Can you hear the rustle of the leaves on the trees, or birds, or crackling fire or the gentle hushing of the waves on the sand.
- Now think about whether you can smell anything such as the salty smell of the sea or the smell of wood smoke or a sweetness of the air.
- When you bring your safe place to mind allow your body to relax. Think about your facial expression; allow it to have a soft smile of pleasure at being there.
- Imagine that, the place itself takes joy in you being here. Allow yourself to feel how your safe place has pleasure in you being here. Explore your feelings when you imagine this place is happy with you being there. Even if it is just a fleeting sense of where the image might be, try to create an emotional connection to this place.

Week 3: Compassionate self

Exercise 4 Compassionate Self

Find somewhere you can sit quietly and will not be disturbed and focus on your soothing rhythm breathing. When you feel that your body has slowed down (even slightly) and you are ready for your practice, imagine that you are a very deeply compassionate person. Think of all the qualities that you would ideally have as that compassionate person. First focus on your desires to become a compassionate person and to be able to think, act and feel compassionately. Next, imagine yourself with each of the qualities we associate with compassion: wisdom, strength, non-judgement and warmth. You may find an order you prefer. We will start with wisdom here because this helps to support the other compassionate qualities - but you may prefer to start with warmth.

Imagine being wise and having wisdom – a wisdom that comes from your understanding about the nature of our lives, of our minds and bodies and that there's so much that goes on inside of us which is not our fault (spend time just on this).

Then when you are ready and have a sense of your wisdom (because of your understanding about the nature of suffering), switch to imagining having strength, maturity, authority. Explore your body posture (sitting or standing confidently and assertively) your facial expressions – remember you are imagining yourself as a person that understands one's difficulties and those of others, in a non judgmental way, and has confidence to be sensitive, with an ability to tolerate difficulties.

Week 4: Compassion Flowing to others

Exercise 5 Focusing Compassion onto others

Engage in your soothing breathing rhythm. Now try to create a sense of being a compassionate person, as best you can. Some days this will be easier than others – even just the slightest glimmer can be a start. Now focus and bring to mind someone you care about (e.g. a partner, friend, parent or child, or an animal, or even a plant). When you have them in mind focus on directing towards them three basic feelings and thoughts:

- May you be well
- May you be happy
- May you be free of suffering

Keep in mind that it is your behaviour and intentions that are important - and the feelings may follow on behind. Be gentle, take time and allow yourself to focus on desires and wishes you create in yourself for the other person/animal/plant. Maybe picture them smiling at you and sharing these feelings. Okay, that's tricky if you are thinking of a plant, but imagine the plant as 'happy' to receive your compassionate wishes. Spend time focusing on this genuine desire of yours for 'the other'.

Week 5: Creating a Compassionate Ideal

Exercise 6 Creating a Compassionate Ideal

First, engage with your soothing rhythm breathing and compassionate expression; bring to mind your safe place, the sounds, the feel, and the sights. Remind yourself that this is your place and it delights in you being here. This may now be the place where you wish to create and meet your compassionate image. You can imagine your image being created out of a mist in front of you, for example. The image may be walking towards you.

Here are some questions that might help you build an image:

- How would you like your ideal caring, compassionate image to look or appear? Would you want your ideal compassionate image to feel/look/seem old or young; to be male or female (or non-human looking, e.g. an animal, sea or light)?
- How would you like your compassionate image to sound? What would be a compassionate voice tone for you?
- Are there any other sensory qualities that would come with your image? Such as colours and sounds?
- How would you like your ideal compassionate image to relate to you? What would help you sense their commitment and kindness for you?
- How would you like to relate to your compassionate image?

Remember your image really wants for you to be free of suffering, to be able to deal with the difficulties, and to flourish. It knows that we all just find ourselves here, living as we do, trying to make the best of our minds and lives. It understands that our minds are difficult, that emotions can run riot in us and that this is not our fault.

Practice experiencing what it is like to focus on the feeling that another mind really values you and cares about you unconditionally. Now focus on the idea that your compassionate ideal is looking at you with great warmth. Imagine that they have the following deep desires for you:

- That you be well
- That you be happy
- That you be free of suffering

Appendix F: Debrief Sheet

Thank you for taking part in the research. The aim of the research was to help evidence the impact of a Compassion Focused Therapy informed intervention in reducing self-criticism and increasing self-compassion in those who have sustained and acquired brain injury. We were also predicted the intervention would acceptable to people taking part and help their goal directed behaviour.

To test this we used a single case design, which is a design that has a small number of participants but frequent observations. The observation in this study were week day questionnaires. The aim is to see if the level of self-criticism and self-compassion in your diary entry changed when you began the intervention, and if this change was consistent across other people taking part in the study.

The hope is that this research contributes to the broader research in forming an evidence base for these types of intervention for people who have had a brain injury.

Your data will be kept securely in line with the data protection act and will not be kept anonymous. Any time the data is presented or used for academic writing, pseudonyms will be used.

Due to the work nature of the intervention and questionnaires you may feel the need for further support. If you do feel the need for further support please contact your GP or access one of the services listed below based on your circumstances or need:

Exeter Anxiety and depression service (IAPT)*

Telephone: 01392 675630

Email: dpn-tr.ExeterDAS@nhs.net

Exeter Samaritans*

Telephone: 0845 790 9090

Email: jo@samaritans.org

Exeter Stroke Association*

Telephone: 01392 447362

Email: laura.freeman@stroke.org.uk

Exeter Headway*

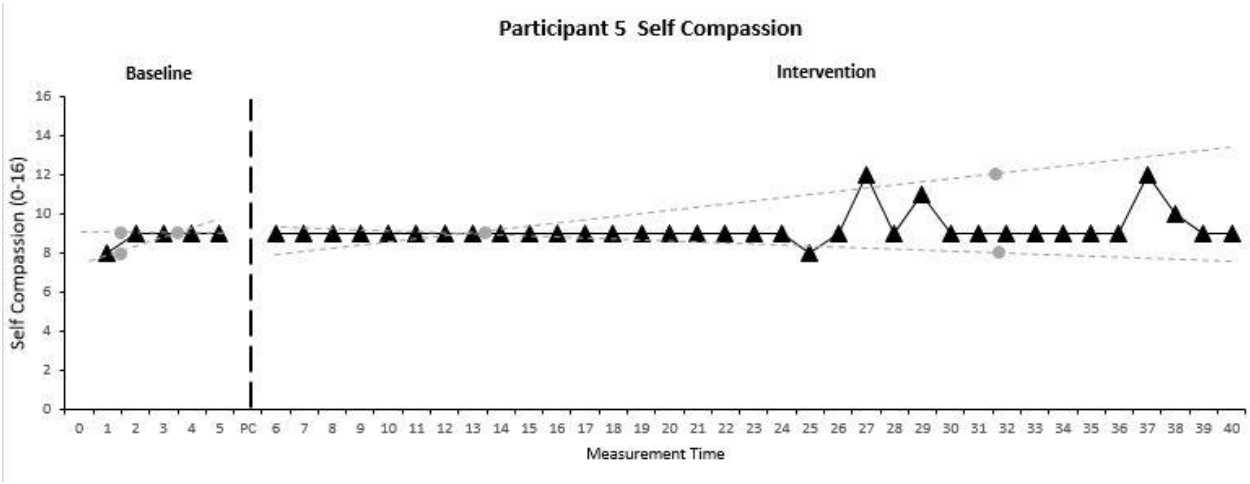
Telephone: 01392 224433

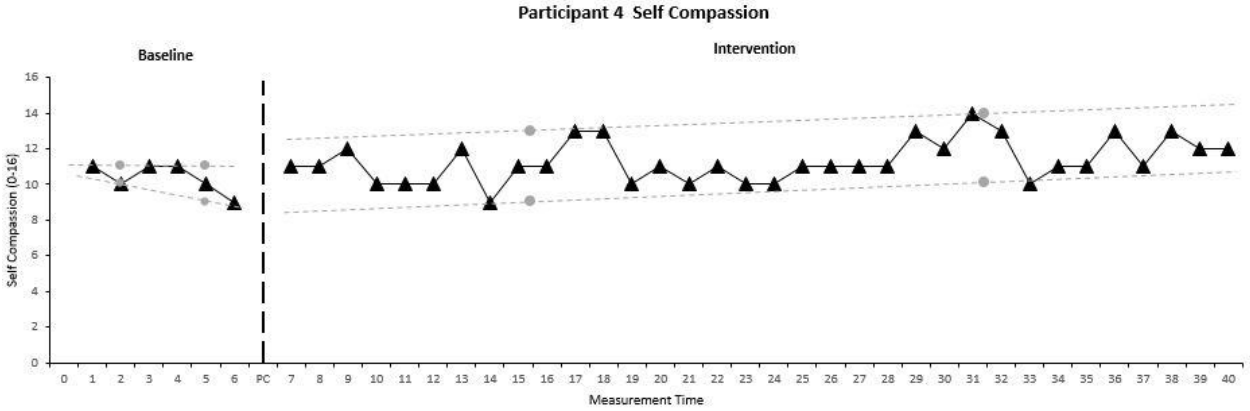
Email: info@headwaydevon.org.uk

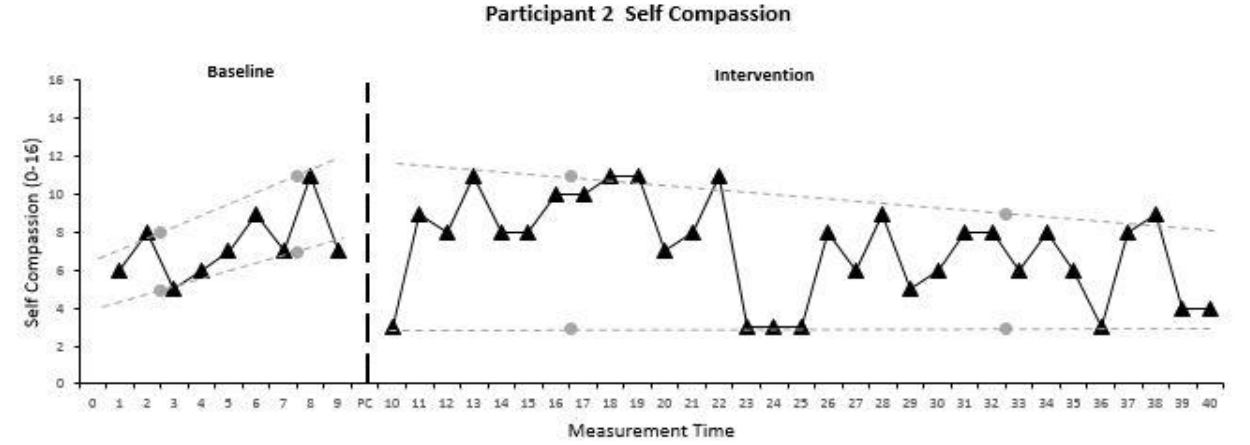
If you have any further questions at a later date about your participation or the research please contact me at ss885@exeter.ac.uk.

***** If participants were not located near Exeter and services closer to their home address were available, these details were replaced with equivalent details of local services.

Appendix G: Visual analysis using trended range of self-compassion.







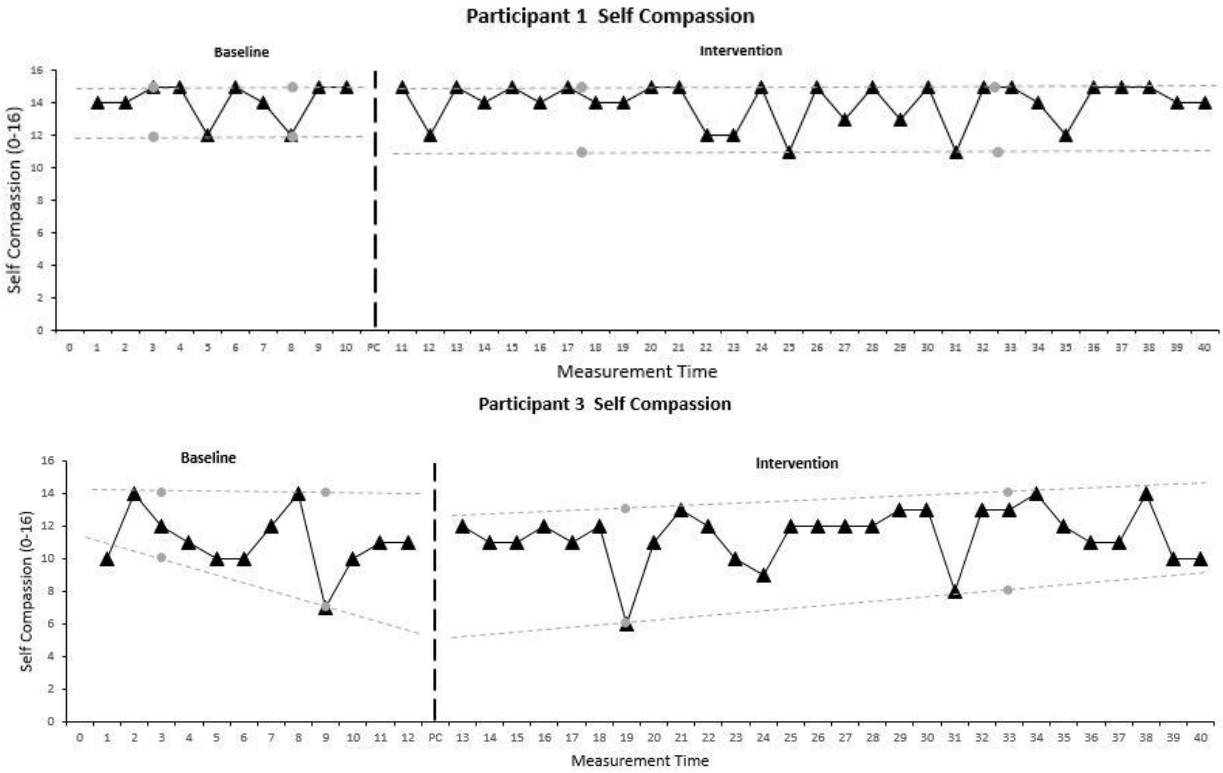
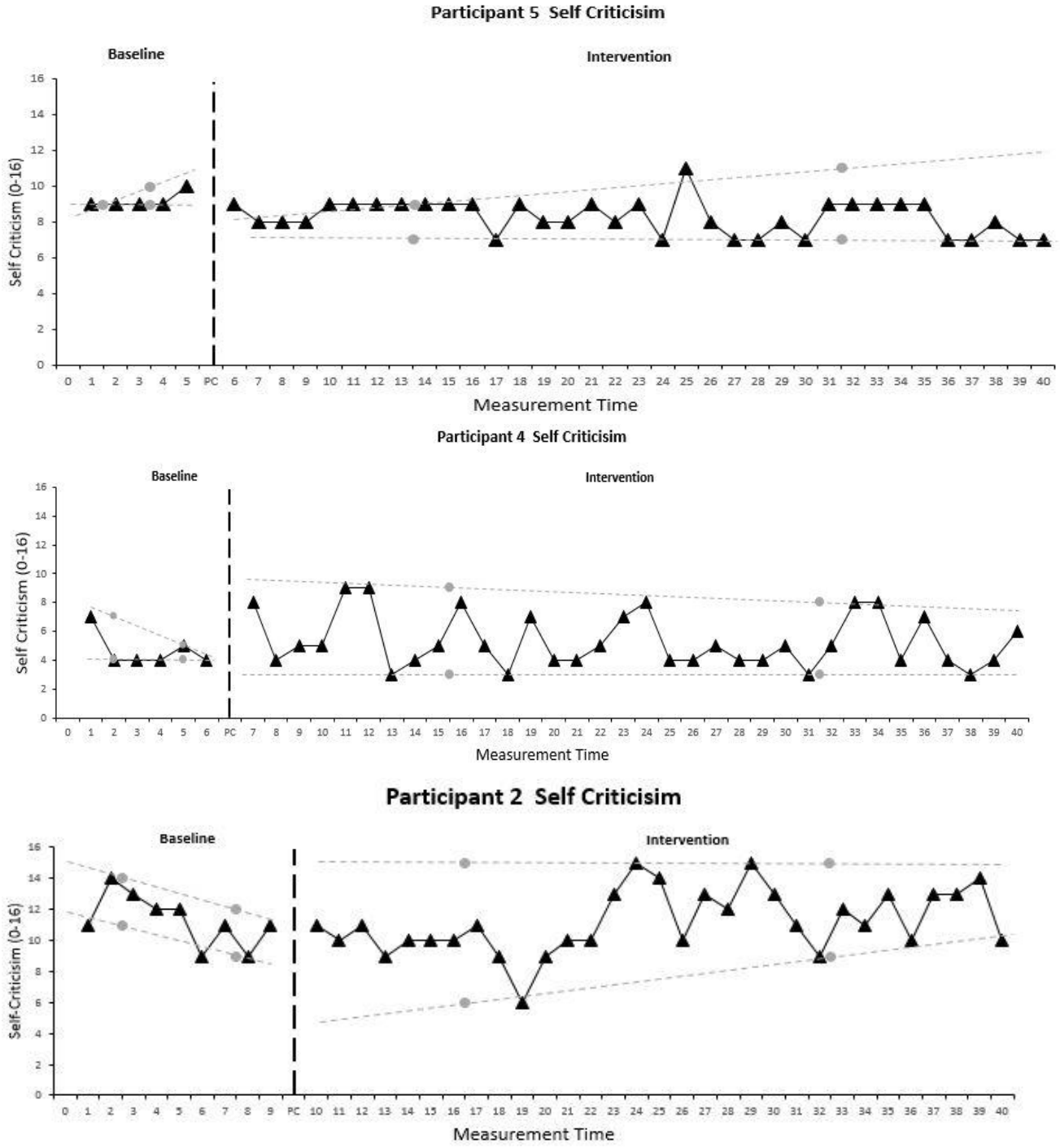


Figure 3. Visual analysis graphs for self-compassion. The dashed grey lines reflect the trended range. Graphs are presented in order of shortest baseline to longest baseline.

Appendix H: Visual analysis using trended range of self-criticism



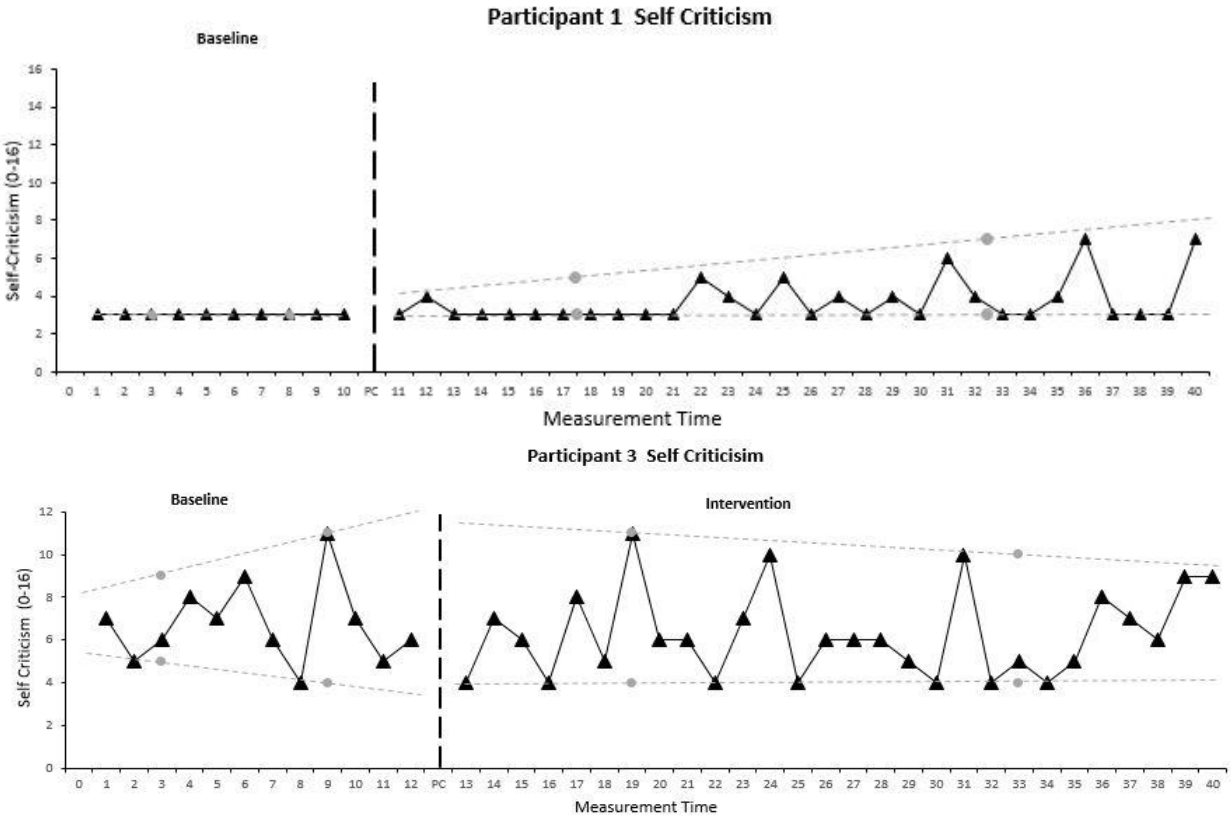


Figure 4. Visual analysis graphs for self-criticism. The dashed grey lines reflect the trended range. Graphs are presented in order of shortest baseline to longest baseline.

Appendix I: Dissemination Statement

The present studies results will be shared to those interested through journal publication, presentation and feedback.

Dissemination to Participants. During the debrief participants received information about the results of the study. Including personalised information about their own results.

Journal Publication. It is planned to submit this research to the Disability and Rehabilitation journal (See appendix J).

Presentation. The findings from this research will be presented to other Trainee Clinical psychologists and research staff as part of the Doctorate in Clinical Psychology course in June 2019.

Appendix J: Preparation and submission requirements for *Disability and Rehabilitation*

Checklist: what to include

1. **Author details**. Please ensure everyone meeting the International Committee of Medical Journal Editors (ICJME) requirements for authorship is included as an author of your paper. All authors of a manuscript should include their full name and affiliation on the cover page of the manuscript. Where available, please also include ORCiDs and social media handles (Facebook, Twitter or LinkedIn). One author will need to be identified as the corresponding author, with their email address normally displayed in the article PDF (depending on the journal) and the online article. Authors' affiliations are the affiliations where the research was conducted. If any of the named co-authors moves affiliation during the peer-review process, the new affiliation can be given as a footnote. Please note that no changes to affiliation can be made after your paper is accepted. Read more on authorship.
2. A structured **abstract** of no more than 200 words. A structured abstract should cover (in the following order): the *purpose* of the article, its *materials and methods* (the design and methodological procedures used), the *results* and conclusions (including their relevance to the study of disability and rehabilitation).
3. 5-8 **keywords**. Read making your article more discoverable, including information on choosing a title and search engine optimization.
4. **Acknowledgement**. Please supply all details required by your funding and grant-awarding bodies as follows: *For single agency grants*: This work was supported by the under Grant . *For multiple agency grants*: This work was supported by the under Grant ; under Grant ; and under Grant .
5. **Declaration of Interest**. This is to acknowledge any financial interest or benefit that has arisen from the direct applications of your research. Further guidance on what is a declaration of interest and how to disclose it.
6. **Data availability statement.** If there is a data set associated with the paper, please provide information about where the data supporting the results or analyses presented in the paper can be found. Where applicable, this should include the hyperlink, DOI or other persistent identifier associated with the data set(s). Templates are also available to support authors.
7. **Data deposition.** If you choose to share or make the data underlying the study open, please deposit your data in a recognized data repository prior to or at the time of submission. You will be asked to provide the DOI, pre-reserved DOI, or other persistent identifier for the data set.
8. **Supplemental online material.** Supplemental material can be a video, dataset, fileset, sound file or anything which supports (and is pertinent to) your paper. We publish supplemental material online via Figshare. Find out more about supplemental material and how to submit it with your article.
9. **Figures.** Figures should be high quality (1200 dpi for line art, 600 dpi for grayscale and 300 dpi for colour). Figures should be saved as TIFF, PostScript or EPS files.

10. **Tables.** Tables should present new information rather than duplicating what is in the text. Readers should be able to interpret the table without reference to the text. Please supply editable files.
11. **Equations**. If you are submitting your manuscript as a Word document, please ensure that equations are editable. More information about mathematical symbols and equations.
12. **Units.** Please use SI units (non-italicized).